A NARRATIVE INQUIRY INTO DESIGN-BASED LEARNING EXPERIENCES, TRANSVERSAL SKILLS, AND FLOURISHING AS YOUR BEST-LOVED SELF

A Dissertation

by

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ABSTRACT

As the workplace is calling for educators to develop the soft skills or transversal skills of students so they are better prepared, and research shows that developing those skills can improve academic achievement and overall well-being, there is still limited research on how to best develop those skills within the educational context. Particularly within the engineering field, industry leaders are demanding that students that leave their educational journey with skills in leadership, teamwork, communication, and critical thinking because they are all critical to the team-based and design-based nature of their jobs. This dissertation explores flipping the need to develop those skills in engineers to using engineering design-based learning experiences to develop those skills in students, as well as students' perceptions on how learning those skills allows them to live at their best-loved self or human wellbeing.

The first article is a serial interpretation that explores what living as your best-loved self might entail. The second article is a narrative-based case study of Tier one university students learning transversal skills and their perception of transversal skills in design-based learning experiences. The third article is an in-depth look at four engineering students journey in an engineering leadership course and the impact it had on them living as their best-loved self. The fourth article looks at the metaphor of 'team as family' and how the rose colored image it portrays does not always align with the lived experience on the team.

DEDICATION

This dissertation is dedicated to Matthew and Ashley. This was a journey we did together and I would not have finished it without your support and laughs along the way. My hope for each of you is that you find the path to flourishing as your best-loved self. I love you forever and always!

I also dedicate this to my Nan. You were an integral part of me knowing, doing, being, and becoming my best-loved self. I miss you, but know you are with me every step of the way. I love you always and forever.

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Contributors

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1. INTRODUCTION

This dissertation is based on the belief that "research is a very designerly kind of activity" (Kimbell & Stables, 2007, p.59). Approaching this research from a designer's way of thinking, knowing, and doing, I attempted to capture the designerly aspects of this process throughout the formatting of the dissertation. Following IDEO's iterative approach to design thinking which relies on the "human ability to be intuitive, to recognize patterns, and to construct ideas that are emotionally meaningful and functional" (IDEO, n.d.), this dissertation will attempt to capture my iterative design thinking processes that led to the sharing of the story embedded within this manuscript. The first chapter will focus on the 'gathering inspiration' for the dissertation through the narrative beginnings and narrative wonderings, and the 'framing a question' or background that inspired the research. The second chapter will be the 'defining the problem' through a literature review of the anchoring concepts across the dissertation and end with the methods used to 'make the ideas tangible.' Chapters three, four, five, and six will be the articles that were my 'test to learn.' Finally, chapter seven will be the discussion or the 'sharing of the story' as I reflect across the ideas, prototypes, constraints, and feedback gathered during this dissertation process.

I invite you to this learning experience that explored the following design challenge: How might we create learning experiences that allow a learner to know, do, be, and become their best-loved self?

1.1. Gathering Inspiration through Narrative Beginnings and Wonderings

This section aligns with the empathy-building stage of design, where the designer explores insights from the users and their needs. Laying narrative inquiry alongside design thinking, these narrative beginnings and wonderings look at the stories of the past, present, and future that provided insights into the users (researcher and learners) and their needs.

1.1.1. Narrative Connections to the Literature of the Past

In 1899, Aesop, Jr., wrote "An Educational Allegory" in a Journal of Education:

A long time ago, when the animal creation was being differentiated into swimmers, climbers, fliers, and runners, there was a school for the development of animals. The theory of the school was that the best animal should be able to do one thing as well as another; and if there was an apparent aptitude in any given animal for doing one thing and an apparent inaptitude for doing other things, the time and effort should be spent upon the latter instead of the former. If one had short legs and good wings, the attention should be given to running so as to even up the qualities as far as possible. So, the duck was kept waddling instead of swimming, the pelican was kept wagging his short wings in the attempt to fly, the eagle was made to run and allowed to fly only for recreation while maturing tadpoles were unmercifully guyed for being neither one thing nor another. All this in the name of Education. Nature was not to be trusted in her make-up of individuals, for individuals should be symmetrically developed and similar, for their own welfare as well as for the welfare of the community. The animals that would not submit to training, but persisted in developing the best gifts they had, were dishonored, called

narrow-minded and specialists, and special difficulties were placed in their way when they attempted to ignore the theory of education recognized by school. No one was allowed to graduate from that school unless he could climb, swim, run, and fly at a certain prescribed rate. So it happened that the time taken by the duck in learning to run had so hindered him from swimming that he was scarcely able to swim at the prescribed rate; and in addition he had been scolded, threatened, and ill-treated in many ways so as to make his life a burden, and he left school humiliated, and the ornithorhynchus could beat him, either running or swimming. Indeed, the latter carried off the prizes in two departments. The eagle made no headway in climbing to the top of a tree. Though he showed he could get there just the same, the performance was counted a demerit, as it had not been done in the prescribed way. An abnormal eel with large pectoral proved he could run, swim, climb trees, and fly a little; he was made valedictorian.

Early in my career, a deep emotional connection to this allegory changed who I wanted to be as an educator which, in turn, changed the behaviors I exhibited in my classroom. Every year on Back to School night, I shared a digital version of this allegory with my students' parents; every single year, tears trickled down my face, and many of my parents' eyes welled up with tears. These parents shared story after story of their kids being beaten down (at the young age of 7 or 8) by the "prescribed" curriculum, and their kids no longer had a glimpse of their 'best-loved self' (Craig, 2013a). Caught in a system that was trying to force their "fish" to climb a tree, the parents were

desperately trying to help make their child climb a tree because that is what school told them is needed for their "future success." In forcing this limited view of success on each student, we were destroying the essence of who the child was, the natural joy of learning the child once experienced, and convincing parents that their child was a failure or would be a failure in the future if they didn't learn how to "climb that tree." Around the same time that this allegory was written, a meeting (1899) was held in Memphis for the Southern Educational Association. One of the keynote speakers, Dr. J.H. Raymond, referenced the above allegory and stated, "if our educational system has for its objects the making of parrots or machines, then the prescribed curriculum is the right plan. If, on the other hand, our objective is to develop thoughtful, self-reliant, progressive men and women, the prescribed curriculum is utterly wrong" (p. 211). With a commitment to the latter, there were times in my career where I had to creatively push back to the dominating and prescribed ways of curriculum implementation, high-stakes testing, and rigid behavior handbooks to help ensure I was part of a student's journey to their best-loved self; I was not going to be the person trying to make a fish climb a tree. Some may call that 'leaving a child behind,' but I call that compassion for the child that was placed in my room. Sometimes this compassion showed up as fighting for the dyslexic student not to miss art class because that was her passion, or refusing to force a kid to cry through a second-grade test when he still did not know how to spell his name or his colors, or it showed up when I kept the student who was throwing chairs in my classroom because they had learned that was a way to get out of facing feelings of inadequacy. Within that same Memphis Meeting, the Superintendent of City Schools in

Pine Bluff Arkansas wrote, “the purpose of the school is not to fit boys and girls to make a living but primarily to prepare them really and truly to live...true education consists in the full and symmetrical development of all the powers of human being (body; mind, spirit)” (p.153). He proceeded to declare “develop the physical chiefly, and we have the modern pugilist of the ancient gladiator; develop the physical and the mental and we have such a personage as Aaron Burr; develop the mental, physical and spiritual and we have given to the world such illustrious and immortal characters as William E. Gladstone and Robert Edward Lee” (p.153). While this allegory and speech were delivered almost one hundred years before I was born, they were intimately connected to the same issues I encountered when I started teaching and are still discussed today.

1.1.2. Narrative Connections to the Experiences of the Present

This next section captures my inspirational experiences that led to the creation of this dissertation.

1.1.2.1. Inspiration 1: Designing Creative Solutions to Ill-Structured Problems

Story. During my second year of teaching, I experienced one of those moments that helped me reimagine my future as a teacher. After a recent move to Texas, I began designing my new classroom and preparing for the little ones that would be mine to love for the year. Filled with excitement, I got my new class list and began the preparations for their first day of school. As teachers glanced at my class list, their faces filled with worry at all the “trouble” kids placed in my class. Countless comments telling me to watch out for this one, this one will spend their days in the office, you will get to know that parent very well, etc. Comments I refused to let paint the picture of my school

year. Late that first week of school, one of my students, Catherine, (the one I had been warned spent most of her days in the principal's office) started yelling, knocking desks over, cursing and destroying my newly decorated classroom. A threat to the other students' safety, I knew I needed to act fast and get the students out of the classroom. After moving the other students to safety, I walked over to her as she ripped down my newly put up bulletin boards, and I began ripping them down with her. She stopped and looked up at me [like I was crazy]. I asked her something like, "Tell me something I do not know about you." She replied, and we continued to chat back and forth while destroying my room.

Reflection. That single decision to destroy my classroom alongside Catherine changed our relationship for the rest of the year. I could have gone with the normal problem-solving process and had her removed from the classroom, face possible suspension, and then have that cycle repeat. I changed the trajectory of the expected solutions to a more sustainable route that met the user's needs.

1.1.2.2. Inspiration 2: Empathy Helps you Reframe

Story. Continuing with my story about Catherine, after a few minutes of asking her personal questions, she looked up at me and said, "why didn't you send me to the principal's office?" I explained to her that she was part of my classroom family, and while we have expectations, I was not just going to send her away every time she had a rough moment. She stopped destroying my room, we talked about how we would fix this (which involved us spending more time together and building that relationship), and we walked together to get the rest of the class and continued with our day. Not a perfect

ride going forward, but we learned a lot, helped each other grow, and began dealing with those emotions that moved her to destroy my classroom.

Reflection. While the relationship had its bumps, we formed a connection based on trust, compassion, and love that helped us navigate the rest of the year. Behaviors are tied to emotional triggers, and if we as teachers only look at addressing the behavior without the emotional trigger, we have failed to begin exploring a sustainable solution. Merely stopping the behavior only provides a short-term fix, but focusing inward to the emotional triggers allowed me to empathize and inspires me to look towards innovative solutions that value the child and their future.

1.1.2.3. Inspiration 3: Ideation Around Design and Emotions

Story. During my teaching career, I stumbled upon using engineering design activities to help my students understand their emotions. I loved creating Engineering focused STEAM experiences because the students were engaged, and it provided an opportunity for me to push their thinking, but over time, I realized I could also use it to help them build better self-awareness. As I added constraints, students would experience emotions related to stress, and I would then start unpacking those feelings with them. As they began to name their feelings and triggers for their behavior, I could then have the same conversation in more organic situations that brought about the same emotions. One student I had, Michael, was diagnosed with Asperger's, and anytime he had got stressed, he ran and hid under a desk. Over time, with engineering design activities, I could shift him to using a stress ball when he got overwhelmed, and then I

got him to reflect with me on a solution. By the end of the year, he never went to hide but was asking for help from fellow students and me when he got overwhelmed.

Reflection. Creating experiences where I could focus on the emotions and behavior from a learning perspective allowed me to help my students transfer that learning into other classroom situations. When I would ask students what they liked about using those engineering experiences to understand themselves, they believed it was a low risk to get it wrong. By creating a context where students could make connections, they also found it easier to look inward and explore possible changes.

1.1.2.4. Inspiration 4: Navigating Constraints and Discovering my Values

Story. Before officially starting my Ph.D. journey, I joined a research team looking at the impact of technology on writing in elementary schools. Tasked with the effective implementation of our 1-1 initiative in my last administrative position, I thought this would be the perfect experience to explore all the trial-and-error teachers and students go through as they embrace the complex learning opportunities that technology has the potential to create. In early conversations, the research team discussed the desire for creativity and fostering a love of writing but as the project began my experience was filled with hours of standardized testing of the students, a focus on using technology for perfect spelling and grammar and the elimination of student choice by forcing the students to use 'voice-to-text' or text prediction when writing their stories. My image of exploring creative digital story-making, discovering how to transfer their ideas from their head to the world and watching my learners fall in love with storytelling was quickly changed to the reality of engaging in systematic, unbiased

research where the increase in accuracy in spelling and grammar, the length of their stories and the enforced following of a particular writing structure were valued. My static role as a researcher was defined, and what was being researched was already determined: this experience filled with control and objectivity and, in search of generalizability, began my emotional journey towards embracing, understanding, and falling in love with narrative inquiry. I had to ask myself, was it the role change from teacher to researcher that was causing this internal conflict, or did I need to explore my role as a researcher more deeply and redefine my identity as a researcher in a way that aligned with my values and beliefs about education?

Reflecting. Engaging in experiences where values conflict can seem like a constraint to living as your best-loved self, but in reality, it provided me a lens to more intimately discover whom I wanted to be as a researcher so I could live as my best-loved self. Embracing the designer's mindset, I had to reimagine a new creative solution that allowed me to know, do, and be my best-loved self.

1.1.2.5. Inspiration 5: Iterating, Prototyping, and Testing

Story. Within that same research experience, I wrestled with the famously posed question from Herbert Spencer (1859): what knowledge is of most worth? The pretest and posttest captured numerical increases in knowledge about spelling patterns, a rubric score on a writing sample based on the number of sentences, structure, etc. and an increase in vocabulary. What about Urban, who fell in love with writing? His pre/post-test scores remained precisely the same. We imposed his numerical research story on him as showing no statistical difference, but I saw his story very differently. One of my

first conversations with him, I asked him to tell me about something fun he had done over the weekend. Similar to his pre-test writing sample, it was one sentence: I played soccer. I continued to explore and ask him questions. The following week, I took him a Toontastic video I created based on our conversation. I included all the details I learned from my exploring, and he got a big smile on his face and began telling me all he noticed in the video from our previous conversation. I challenged him to create a new digital story with a different plotline. He experimented with it during the limited time the intervention allowed, and we celebrated his progress in mastering the technology and adding details to his story. That next week, he excitedly came running up to me to share that he had downloaded Toontastic at home and has been creating stories every night. I will never forget what he said to me, "I never knew I had such great stories in my head."

Reflection. Where is that in the research report? Nowhere, because it resulted in no numerical difference on his pre/posttest, but in my sense-making and I believe in his sense-making based on the words he said, that growth and learning took place. What made it even more difficult for me, was the lead researchers on the project forced me to stop allowing him to use Toontastic and move him towards writing in Google Docs. This forced action drastically conflicted with my inner self screaming to let him keep exploring and developing his identity as a storyteller through Toontastic.

1.1.3. Narrative Wonderings for the Future

As I began exploring my wonderings that might guide my research, I kept coming back to how design-based learning experiences could support the social and

emotional growth of learners? What would the teacher need to do during these experiences to make social and emotional learning happen? How could you use reflection to support growth? What is it about those types of experiences that might allow a focus on social and emotional learning? What is the value of focusing on social and emotional growth? How does growth in social and emotional skills allow one to better lead self and lead others? How can we better utilize design-based experiences to create a more holistic education experience? How will focusing on the path to personal well-being or living as your best-loved self impact self and society in a more sustainable way?

With a long list of questions and hopes for a more innovative future, this dissertation was the beginning of an exploration of that overarching design challenge question: How might we create learning experiences that allow a learner to know, do, be and become their best-loved self?

1.2. Framing a Question

In the first section, I proposed the design challenge question of, how might we create learning experiences that allow a learner to know, do, be, and becoming their best-loved self? Narrowing in from that design challenge question, the inquiry question that bounded this dissertation was how might we utilize design-based learning experiences to develop transversal skills as a path to supporting learners in knowing, doing, being, and becoming as their best-loved self? This section will explore the context, need, purpose, and significance that frame this inquiry.

1.3. Contextualizing the Landscape of the Inquiry

While learners are often trained for domain-specific skills or taught content area knowledge within the silo of a subject, it is often the skills that transcend disciplines that allow one to truly know, do and be their best-loved self. Transversal skills are "skills that are typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings" (UNESCO-International Bureau of Education, 2013). These transversal skills also referred to as soft skills, non-technical skills, social and emotional skills, leadership skills, emotional intelligence, etc. in both research-based articles and practitioner-based articles. While each of those may have slightly different bounds, they are often used as synonyms, but for the purpose of this study, I will use transversal skills as it is bounded by the UNESCO definition. At times I will use the other words when quoting from another source but will ensure it was used in a way that is synonymous with the meaning of transversal skills used within this study. In contextualizing this inquiry, this section will look at how transversal skills impact the workplace, PK-16 education, engineering education, and the individual person.

1.3.1. The Broadest Context: Transversal Skills for the Workplace

As a society, we continually talk about how much the world is changing and how volatile the world has become; search VUCA (Volatility, Uncertainty, Complexity, and Ambiguity), and you will find no shortage of references, opinions, and solutions. While I agree that our world can be described as VUCA, I would argue that someone a hundred years ago would have characterized the world precisely the same way; just as others

described the struggles in education the exact same way as referenced in chapter 1 with "The Educational Allegory" and the Memphis meeting from right before the turn into the 20th century. The Center for Creative Leadership (CCL) (2019) offered a different acronym, RUPT™ (Rapid, Unpredictable, Paradoxical, Tangled), which focuses less on describing the conditions and more on describing the thinking or awareness needed to navigate the world we live in (Horth, 2019). The CCL suggests that through metaphoric reasoning, shared sense-making, integrative thinking, and recognizing patterns that individuals can practice learning agility, adapt to new and challenging conditions, embrace the interconnectedness of complex systems to cross-boundaries effectively, and leverage the dichotomies or polarities to innovate across competing priorities. Developing people's mindset, thinking, and decision making so they can navigate the disRUPT™ ion they face in the real world involves an education focused on more than developing highly technically skilled professionals. It is often the transversal skills that help us navigate disRUPT™tion and are often the deciding factor for extending an offer to one of the final candidates in the hiring process (OECD, 2017). According to a Gallup Survey (2010), employers found that the transversal skills of teamwork, adaptability, problem-solving, and communication profoundly impact decisions for hiring new graduates, and another survey of Canada's largest employers found leadership, people skills, and team building to be more important than technical skills (Hewitt, 2016). Transversal skills transcend across six domains: (1) critical and innovative thinking, (2) inter-personal skills (communication, teamwork, etc.), (3) intra-personal skills (self-discipline, perseverance, etc.), (4) global citizenship (tolerance,

respect for diversity, etc.), (5) media and information literacy, and (6) other (left open for researchers and professionals to identify skills that do not fit neatly into one of the other categories) (UNESCO-International Bureau of Education in Bangkok, 2014). Developing learners for the workforce provides them a pathway to not only impact their personal success, but impact society as a whole.

1.3.2. The Broad Context: Transversal Skills for Education

Focusing on the whole child has become a hot topic in education, and organizations like the Collaborative for Academic, Social and Emotional Learning (CASEL) and the Partnership for 21st Century Learning (P21) have emerged as a way to address the need for educating more than just the mind. CASEL focuses on social and emotional learning (SEL) and has developed a framework for five competencies to teach across various contexts, such as classrooms, homes, and communities. The five competencies include self-awareness, self-management, social awareness, relationship skills, and responsible decision making. P21 developed a framework for 21st Century Learning of the "skills, knowledge, and expertise students must master to succeed in work and life" (Kids, 2015). Included within their framework are skills such as the learning and innovation skills of critical thinking, communication, collaboration, creativity (4C's) and life and career skills of adapting to change, being flexible, managing goals and time, working independently, interacting effectively with others, working effectively in diverse teams, and managing projects. In 2018, the National Association of Colleges and Employers (NACE) found problem-solving skills, the ability to work in a team, communication skills, and leadership to be the most desirable

attributes of new college graduates. The need for a focus on these skills has been supported across various research studies, for example, in a study done by Columbia University (2015), they found that for every dollar spent on evidence-based SEL programs, there would be a return on investment of $11. Mahoney, Durlak, & Weissberg (2018) compared K-12 schools with SEL programs and those without, finding schools with the program improved their skills 57% more than those without an SEL program, had 27% more improved academic performance, and 24% more improvement in students' emotional well-being and social behavior. Other studies have shown that students with more developed social and emotional skills perform better academically, have higher graduation rates, earn higher incomes and were less likely to have mental issues (Dacre Pool & Qualter, 2012; Depaoli et al., 2017; Durlak et al., 2011; Lopes et al., 2004; Parker et al., 2004, 2006; Rozell et al., 2002). Whereas students with less developed social and emotional skills are more likely to be arrested, have a teenage pregnancy, behavior problems in school, emotional distress, and use drugs (Brackett et al., 2004; Freedman & Jensen, 2007; OECD, 2018; Rivers et al., 2013).

1.3.3. The Narrower Context: Transversal Skills in Engineering Education

Beginning as far back as the 1950s with *The Grinter Report* (Grintner, 1955), engineering committees encourage some soft skill or transversal skill curricula for engineers (Schulz, 2008). The Green Report, *Engineering Education for A Changing World* (1994), issued a call for institutional change to meet the evolving industry demands by incorporating transversal skill development into their programs. Some

transversal skills targeted in the report were team skills, communication skills, leadership skills, understanding of diversity, and making decisions knowing the societal, economic, and environmental impact. At the turn of the 21st century, the Accreditation Board for Engineering and Technology (ABET, 2017) included the transversal skills of working on multidisciplinary teams, making ethical decisions, communicating effectively, and engaging in lifelong learning within their accreditation criteria. In 2015, the American Association of Engineering Societies (AAES) and the U.S. Department of Labor (USDOL) worked together to develop an Engineering Competency Model that outlines the core competencies of engineering professions. While the model includes domain-specific competencies, it also captures many transversal skills: interpersonal skills, adaptability, lifelong learning, teamwork, creative thinking, critical thinking, decision making, ethics, initiative, integrity, and communication. For leaders or managers in the engineering field, it included additional transversal skills: delegating, supporting others, motivating and inspiring others, managing conflict, and team building. As the landscape of engineering continues to change and include more team-based work, industry is demanding more socially and contextually aware engineers who can navigate the flow between individual and team-based work in a way that leads to a globally sustainable future. As a response to industry needs, engineering education is looking at ways to embed the transversal skills into the technical courses in an effective and efficient method (Schulz, 2008). Design projects or project-based learning (PBL) has been highlighted as a possible way of fostering transversal skill development for

engineering students (Kamaruddin et al., 2012; Phusavat et al., 2019; Sanchez-Martin et al., 2017).

1.3.4. The Narrow Context: Transversal Skills for Wellbeing

According to the World Health Organization (WHO) (2014), "state of wellbeing is when the individual realizes his or her own abilities, can cope with normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (n.p.). In a wellbeing policy statement, the researchers (Harper et al., 2011) defined wellbeing as being present when "a person realizes their potential, is resilient in dealing with the normal stresses of their life, takes care of their physical wellbeing and has a sense of purpose, connection and belonging to a wider community. It is a fluid way of being and needs nurturing throughout life" (p.10). Based on Aristotle's concept of well-being, it would be living well and doing well (Michalos, 2017). Within the wellbeing literature, feeling good is part of the hedonic well-being, which focuses on positive emotional states, whereas a focus on meaning, purpose, self-realization is part of the eudemonic approach to understanding well-being. Seligman (2011, 2018) proposed the PERMA model of well-being, which includes positive emotions, engagement, positive relationships, meaning, and accomplishment. Higher levels of wellbeing are linked to adaptability, better mental health, academic achievement, and a decrease in behavior problems (DeCastella & Byrne, 2015; Yeager & Dweck, 2012). Other research has shown that learners are not graduating with the ability to meet the demands of society often leaving them with feelings of anxiety, depression, or disconnected from the

experiences of joy and a lack of purpose or meaning in both their personal and professional lives (Turney & Goodsell, 2012). By focusing on developing more than just a learner's intellectual growth, we have the potential to positively impact not only their academic outcomes but life outcomes as well (Brackett et al., 2004; Lomas et al., 2019; Moore et al., 2015).

1.4. Need for this Inquiry

With an awareness that strong transversal skills can increase employability (OECD, 2017), improve academic achievement (Mahoney et al., 2018), impact one's ability to work on a team (Druskat & Wolff, 2001), and allow one to 'adapt to change and lead meaningful and productive lives' (UNESCO-International Bureau of Education in Bangkok, 2014) as well as many other positive outcomes, more research is needed on how to effectively support the development of these skills within our PK-12 and higher education contexts. In a report, *Are They Really Ready To Work?: Employer's Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century Workplace (2019*), the collaborative team found that the top 3 missing transversal skills are (1) problem solving, critical thinking, innovation, and creativity, (2) ability to deal with complexity and ambiguity, and (3) communication. In that same report, they found that over 50% of respondents felt skill shortages have worsened or greatly worsened over the last two years and that education systems have done little or nothing to help address the skills shortage issues. CASEL's *Ready to Lead* (Atwell & Bridgeland, 2019) report found that 97% of principals believe that teaching SEL skills in schools will improve student behavior, learning, and development, but only 35% report

having a plan to teach students those skills. OECD (2017) found more ties between SEL skills and life satisfaction than cognitive skills and life satisfaction. With the growing research on the impact transversal skills have on significant life outcomes, such as academic and workplace success and overall well-being, more research is needed on effective ways these skills can be developed within the educational context (PK-12 and higher education).

1.5. Purpose of this Inquiry

This narrative inquiry intends to more deeply understand how design-based learning experiences (DBL) could be utilized in the development of transversal skills and how a focus on developing these skills contributes to a learner living, doing, and being, and becoming their best-loved self. For this study, transversal skills are defined as "skills that are typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings" (UNESCO IBE 2013). For the context of this study, design-based learning (DBL) experiences are defined as problem-based team learning experiences where learners utilize the processes of inquiry and reasoning and build knowledge-in-action through interactions and iterations as they move towards designing innovative artifacts, systems, and solutions. Best-Loved Self is defined as experiencing more satisfying lives (Craig, 2013; Schwab, 1954,1978) By more fully understanding the connection between design-based learning experiences, transversal skills, and best-loved self, we can begin to understand if utilizing these experiences to develop a learner's transversal skills would be effective, while also exploring their perception on

how focusing on these skills allows them to know, do and be their best-loved self. The goal of this work is to capture the empathy-based knowing that begins the design thinking process by capturing the human experience through story with the hope of completing future research that continues the design thinking process towards an innovative solution for developing transversal skills within the educational context. By starting with the human experience, valuing their personal story, and not pre-assigning an expected outcome, we allow the learner to have the agency in exploring the value of intersecting design-based learning experiences, transversal skills, and knowing, doing and being and becoming your best-loved self.

1.6. Significance of this Inquiry

This inquiry explores a gap in understanding how to effectively develop transversal skills within the formal education structure by looking at how design-based learning experiences might be utilized to develop these skills in learners. Insights gained could potentially support more effective and efficient use of design-based experiences and projects used within engineering education as a pedagogical approach in supporting learner growth in transversal skills. By developing the transversal skills during their formal education, we could help learners to have a more positive educational experience, increased academic achievement, better preparation for the workforce, and positively impact their long-term well-being.

1.7. Research Puzzles

The central design challenge that guided this inquiry was, how might we utilize design-based learning experiences to support learners in knowing, doing, being, and

becoming their best-loved self? The following sub-questions focused the narrative inquiry on the learners' experiences:

1. How does focusing on the development of transversal skills impact a learner personally and professionally? How does it contribute to them living as their best-loved self?
2. What are learners' perceptions of utilizing design-based learning experiences to support the development of transversal skills?
3. What embodied (tacit) knowledge of transversal skills exists within a prototype from design-based learning experiences and how does reflecting on that prototype supports the learner in eliciting that embedded knowledge as a lens into their current transversal skills, as well as potential ways to grow their transversal skills?

2. LITERATURE REVIEW

In the first chapter, my personal stories related to the experiential foundations of my narrative wonderings, along with the context, need, significance, and purpose of this study, were outlined. It concluded with the research puzzles that guided this narrative research experience of exploring how might we create design-based learning experiences that allow a learner to know, do, be, and become their best-loved self?

1. How does focusing on the development of transversal skills impact a learner personally and professionally? How does it contribute to them living as their best-loved self?
2. What are learners' perceptions of utilizing design-based learning experiences to support the development of transversal skills?
3. What embodied (tacit) knowledge of transversal skills exists within a prototype from design-based learning experiences and how does reflecting on that prototype supports the learner in eliciting that embedded knowledge as a lens into their current transversal skills, as well as potential ways to grow their transversal skills?

In this chapter, the relevant literature that provides the conceptual foundation for this dissertation was explored. In defining the problem, I combined what was learned from the information gathered during the empathize stages (chapters 1 and 2) with what is already known about the topic to more fully define the problem. First, the conceptual framework that guides this study will be designed through Dewey's work on experience, Schwab's work on curriculum, and Craig's work on best-loved self. Next, the literature review will explore what is already known about the six commonplaces of curriculum that bound this study: design-based learning experiences (milieu), transversal skills (subject matter), coaching (teacher), reflecting in and on experiences (learner), creative decision making (curriculum-making), and embodied knowledge (prototypes). The

literature review concludes with a synthesis of the six commonplaces through the lens of the best-loved self.

2.1. Conceptual Framework

In designing the conceptual framework that will guide this dissertation, I will weave between what the literature says and the prototype that I captured as I iterated towards the final prototype that provided the framework to my research.

2.1.1. Education is Experience

For Dewey (1938), education is experience and ongoing experience is life. As one journey through life, the intersection of the sensemaking of our past experiences and our envisioned story of the future collide to impact our lived story of the present. Dewey (1938) captured the ongoing experience of life through three commonplaces: continuity, interaction, and situation. Continuity captures past memories, present actions, and future intentions that exist within one's experiences (Olson & Craig, 2009). Interaction takes the experience from only within the person and explores the external social and physical interactions within their environments. Situation places the experience in context and acknowledges that we move from situation to situation. Experience is both personal and social, and in all experience, the personal and social are always present (D Jean Clandinin & Connelly, 2000), or experience can be seen as "individually continuous and socially interactive" (Pembrook, R. & Craig, 2009, p.797). Envisioning the connection of the unbounded time (past, present, future), unbounded people (self and others), and unbounded space (contexts that move) of experience through Dewey's (1938) eyes, he seems to release education from the confinement of the classroom and allow it to exist

across the many landscapes of our lived experiences with a focus on unbounded growth instead of bounded learning. Figure 2.1 captures how, within any experience, the past, present, and future self are always present.

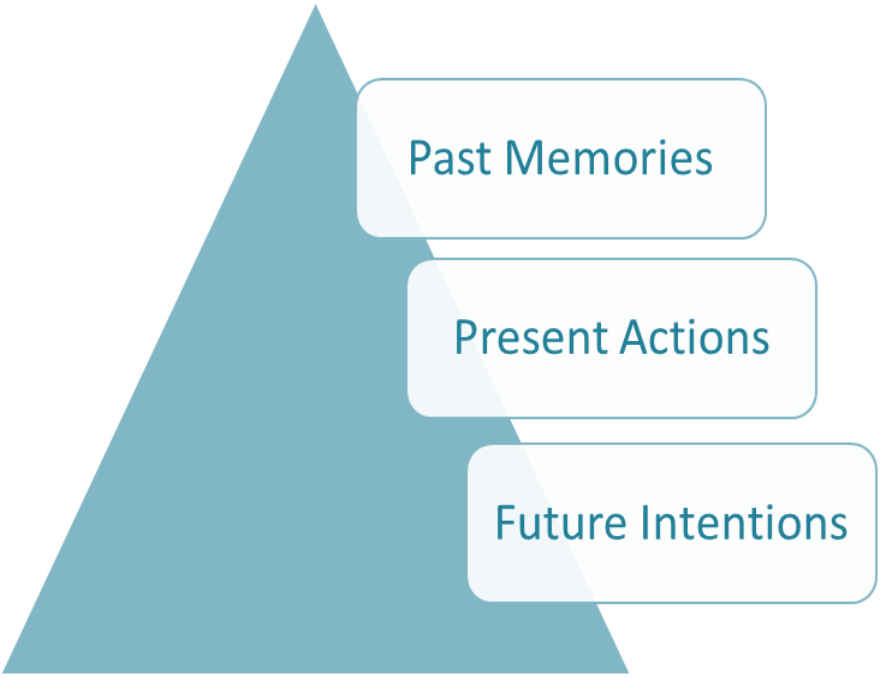

Figure 2.1 Prototype of past, present, and future self.

Figure 2.2 captures that within any experience there are personal (inner) interactions and social (external) interactions co-existing, meaning that in any one experience no one is having the exact same experience because each individual's past, present and future self is present and in turn is impacting their sensemaking of the experience. Utilizing the teeter-totter image captures the constant negotiation between personal needs and social needs or inner thoughts and outer actions that happen as all the players interact within a lived experience.

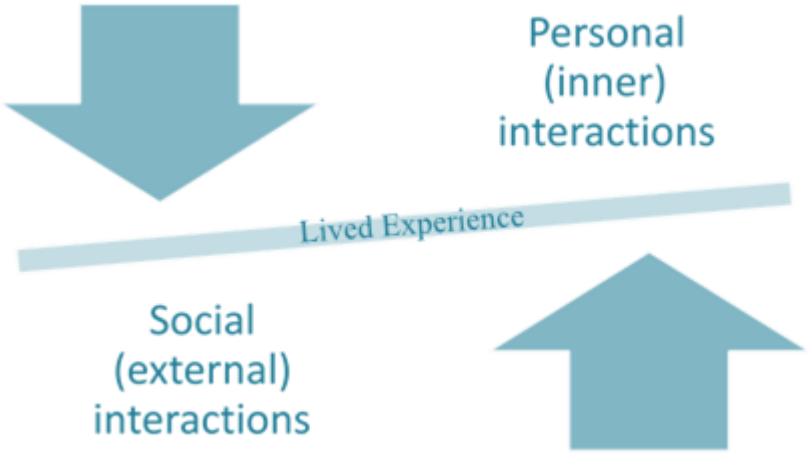

Figure 2.2 Negotiation between the personal and social in lived experiences.

Dewey saw education and experience as interwoven or deeply connected, allowing one to conceptualize 'lived experience' as curriculum (Clandinin, D. J., & Connelly, M. 1992). Schwab (1973) conceptualized the five commonplaces of curriculum: teacher, learner, subject matter, milieu, and curriculum making. The commonplaces, or "bodies of experience" (Schwab, 1973, p. 502), interweave in different ways across different situations, and while one commonplace may seem highlighted in one particular moment, all are of equal value in the journey. For Schwab (1973), subject matter involved the "scholarly materials under treatment and with the discipline from which they come" (p.502). When creating curriculum for learners, Schwab (1973) stated that we must have general knowledge about the age group, as well as an intimate knowledge of the children engaged in the learning experience. For Schwab (1973), milieu involved the context, especially the relation of learners to other learners, the relation of learners to the teachers within the classroom, and the relation to

others in the broader community that might affect the learner and "what can and cannot be attempted in a curriculum" (p.502). The knowledge of teachers should include what they know, how flexible they are, their character and moods, how they feel about themselves, etc., because all influence how they will relate with the children and to each other (Schwab, 1973). Schwab's final body of experience was curriculum-making, which involves a process that makes simultaneously relevant the other four experiences, so each is a resource to each other and not the sole deciding factor. Captured in Figure 3 is the intersection of knowledge that resides within each of the five bodies of experience where enacted curriculum, or "lived experience" has the potential to create a 'method of the practical [that is] a complex, fluid, transactional discipline aimed at identification of the desirable and at either attainment of the desired or at alteration of desires" (Schwab, 1970, p. 5).

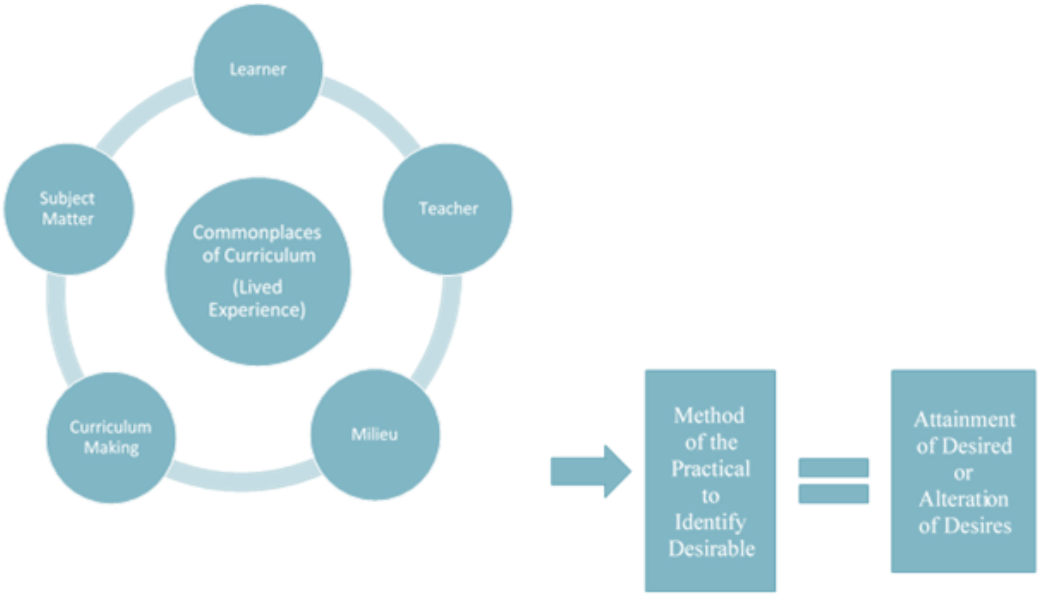

Figure 2.3 Schwab's commonplaces of curriculum leading to desired outcomes.

2.1.2. Desiring Curriculum for Living as Best-Loved Self

Embedded within the complexity of 'lived experience' as curriculum, Schwab (1954) stated that "education cannot...separate...the intellectual from feeling and action, whether in the interest of one or...the other" (p.108). Amidst his interconnected and humanistic view of education, Schwab made particular efforts to value self-agency and teacher agency: using words for self-agency such as "self-moving living thing," able to "produce itself," "develop itself" and to create a 'personal history" (Schwab, 1964, p.8) and describes teacher-agency through statements such as "fountainhead of curricular decisions," [students] "are better known by no one [else] but the teacher," and claiming those teacher deliberations are a "pooling of diversities of experience and insight" (Schwab, 1969, p.30; 1983, p.245). Underpinning the interconnection of intellect, feeling, and action and self-agency and teacher-agency, Schwab (1969) imagines curriculum making as the intersection of constant relationships and negotiations between teacher, learner, subject matter, and milieu. Schwab's framework places curriculum-making as more than teaching the desired set of static objectives or formal knowledge that can be assessed because it remains constant over time, place, and context, which he refers to as curricular problems that address "states of mind" (Schwab, 1969, p.2-3). His framework values the personal practical knowledge needed for complex, uncertain, unstable, unique and value-conflicting contexts (Schön, 1983, p.39) that arise as humans interact, seeking to address the practical problems, which he says rise from "states of affairs" (Schwab, 1969, p.3). Schwab goes on to state that these "practical problems can be settled by changing either the state of affairs or our desires…practical problems

intrinsically involve states of character and the possibility of character change" (Schwab, 1969, p.3). It is the acquisition of practical knowledge that allows one to navigate dynamic situational or context-specific experiences in what Schwab (1971) calls the eclectic arts: "arts by which we ready theory for practical use...arts by which we discover and take practical account of the distortions and limited perspective which a theory imposes on its subject" (p.495). Seeing curriculum as eclectic, non-linear, "deliberate" decisions that are "enacted" through the interactions between the teacher, milieu, subject matter, and students, Schwab sees knowledge not just as improving the state of mind but improving the state of affairs. Curriculum is more than just 'explanation and understanding', it must address "human needs" (Schwab, 1971, p. 597) and in turn will change both the individual and "shape society in the direction of goodness" (Connelly, He, & Phillion, 2008, p.10). Figure 2.4 (prototype) captures how a curriculum focusing on the practical involves a learner's present-self interacting with experience with the desired outcome of becoming a more desired future self while still maintaining regard to the collective goal of a future desired society.

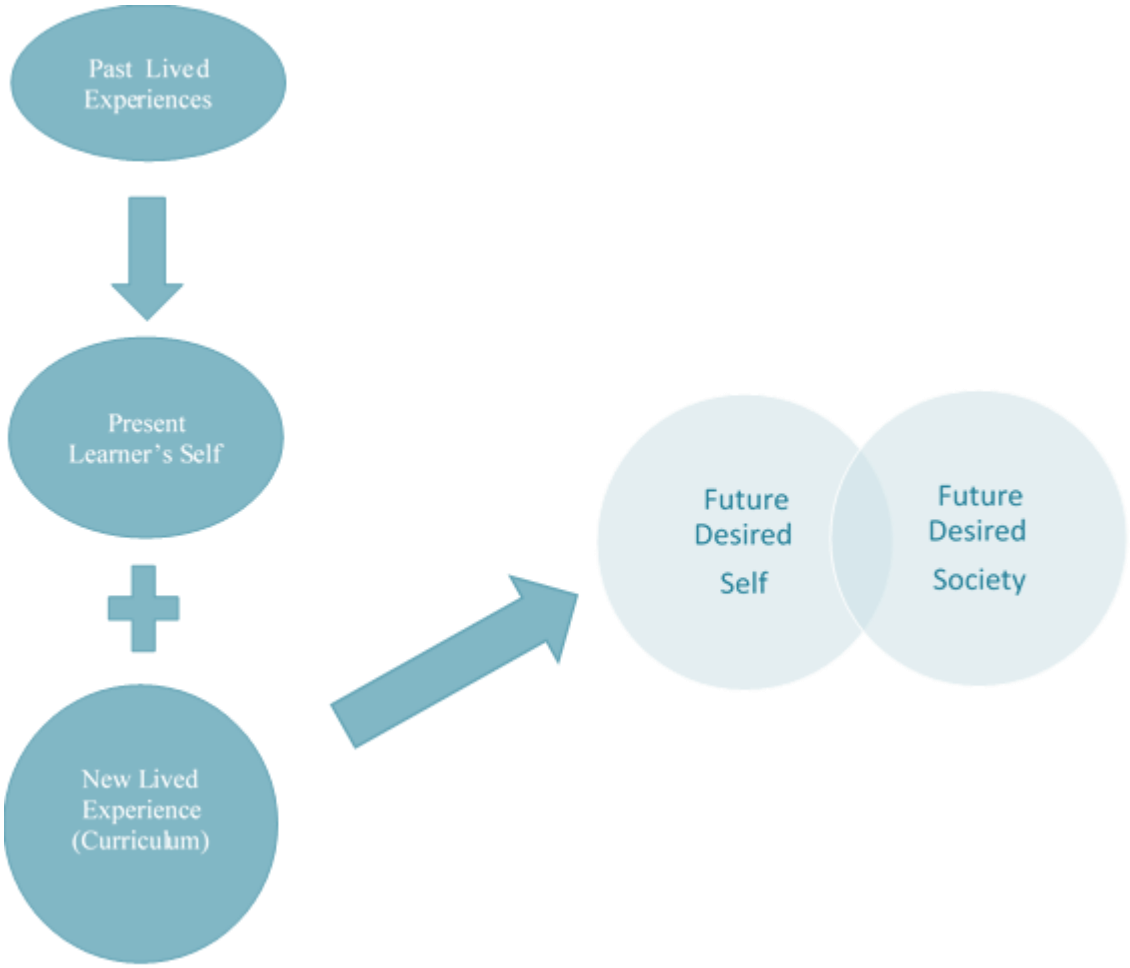

Figure 2.4 Curriculum that addresses human need.

In imagining the meaning of a future desired self, we can look to Schwab's use of "best-loved self" (Schwab, 1954/1978):

> He [Joseph Schwab] wants something more for his students than the capacity to give back to him a report of what he himself has said. He [Joseph Schwab] wants them to possess a knowledge or a skill in the same way that he possesses it, as a part of his best-loved self...He [Joseph Schwab] wants to communicate some of the fire he feels, some of the Eros he possesses, for a valued object. His controlled and conscious purpose is to liberate, not captivate the student. (p.124-135).

In living as your best-loved self, Schwab connects it beyond a "state of mind" to a state of knowing through the feelings of "fire" and "eros" for a valued object, a state of doing through "liberated" actions for a valued object, and a state of being through living their purpose through the possession and enactment of "knowledge or skill." As Craig (2013) explored Schwab's notion of best-loved self, she stumbled upon an unpublished manuscript (*Community: A Mission for the Schools*) in the Schwab Archive at the University of Chicago. In describing what she read, Craig (2013) stated that Schwab "emphasized the importance of having 'more satisfying lives' (p.i.)" (p.270). Craig (2013) went on to describe how, when she "read that preface, [she] could not help but think that best-loved selves figured importantly into Schwab's vision of more satisfying lives" (p.270). In the closing comments of her article, *Teacher Education and the Best-Loved Self*, Craig (2013) referenced the Delors Report (Delors, 1996) in which the United Nations Educational, Scientific, and Cultural Organization (UNESCO) universally agreed upon the four pillars of education: learning to know, learning to do, learning to live together, and learning to be (Delors et al., 1996, p.8). Craig proceeded to claim that she "think[s] Joseph Schwab's notion of the best-loved self attended in a very large way to being and living together" (2013, p. 270). In accepting Craig's insights on Schwab's notion of best-loved self, we can collapse the idea of future desired self and future desired society into the concept of best-loved self, as depicted in the following prototype (Figure 5):

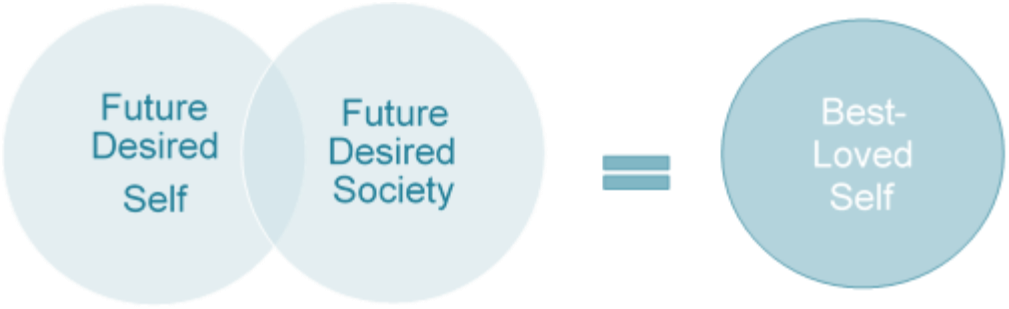

Figure 2.5 Personal and societal aspects of best-loved self

By collapsing those into a single construct, we have a new prototype for a curriculum focused on the outcome of best-loved self:

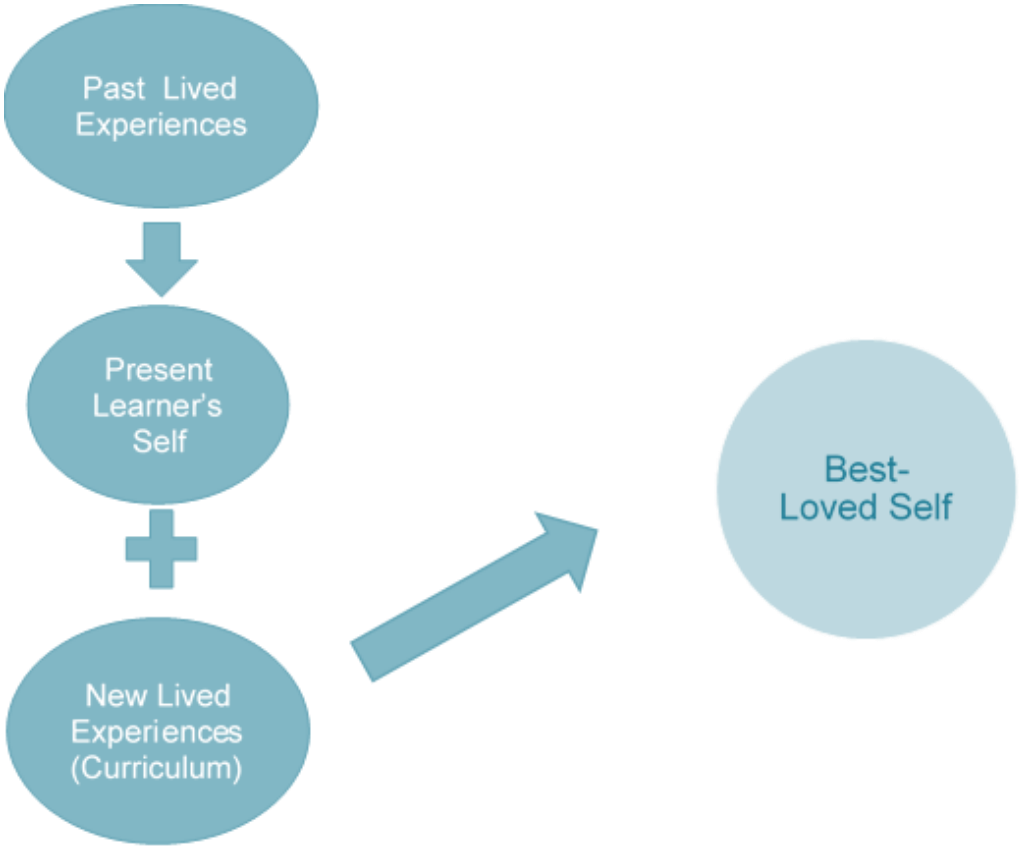

Figure 2.6 Curriculum focused on growing a learner's best-loved self.

2.1.3. Designing Curriculum (Lived Experience)

In recognizing that the designing of curriculum (lived experience) is a creative endeavor as embraced through the image of teacher as curriculum maker or teacher as designer, I explored the connection between Schwab's commonplaces of curriculum and design and creativity research. A designer embraces "human centeredness, empathy, mindfulness of process, culture of prototyping, a show don't tell approach, bias towards action and radical collaboration" (McKenney, Kali, Markauskaite, & Voogt, 2015, p.186). Human centeredness and empathy shows up in Schwab's focus on teacher and learner, mindfulness of process shows up in Schwab's focus on curriculum-making, the show don't tell, bias towards action and radical collaboration show up in his focus on the practical and social aspects of experience, as well as his focus on looking at curriculum through the tensions of all five commonplaces. Explicitly missing from his commonplaces is the 'culture of prototyping;' however, you see glimpses of it in his writings, such as when he discussed applying "different competing theories appropriately to different practical problems…[one could create] materials…[or] a battery of varied and useful tools" (Schwab, 1969, p.13). In 1961, Rhodes developed the four P's of creativity: product, process, person, and press (environment). In Schwab's commonplaces, we see process in curriculum-making, person in teacher and learner, and press in milieu. Product could be seen as solely the final lived experience, but within design literature there are many prototypes that lead up to the enacted, final product and in reality, that final product is just the final-product-for now. In Kelley's (IDEO, 2001,2005) design thinking process consisting of empathizing, defining, ideating,

prototyping, and testing, we once again see the importance of the prototype. The knowledge that exists within the prototype is critical to continuing the design process towards innovation. For the purpose of this dissertation, prototype (see Figure 7) will be added as a sixth commonplace or "body of experience" (Schwab, 1973, p.502):

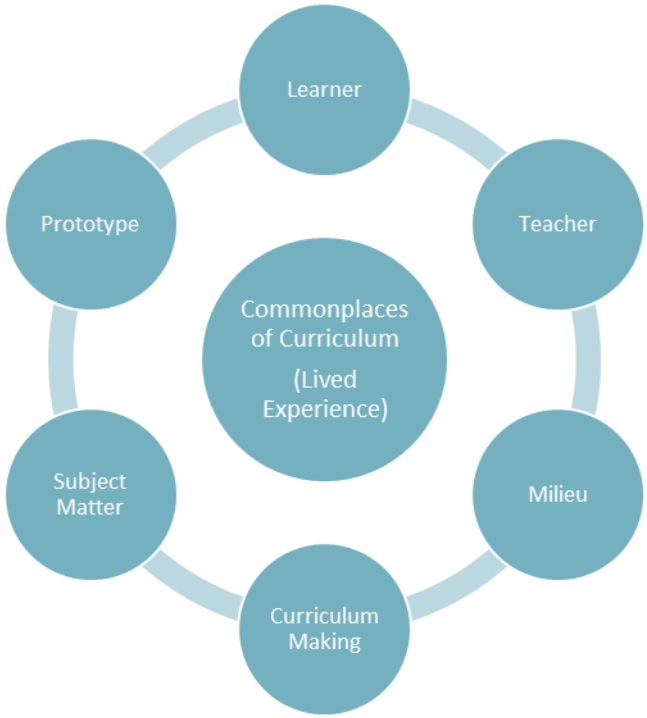

Figure 2.7 Reimagining Schwab's commonplaces through the lens of design.

In combining all the prototypes up until this point, I created the conceptual framework (see Figure 8) for designing curriculum for living as your best-loved self. It depicts how curriculum is lived experience that is both personal and social in nature. For those lived experiences to be curriculum, they must take into account all six commonplaces and they must value that each learner has their own version of past,

present, and future. By allowing all those forces to exist at once, we have the potential to design curriculum that allows one to live as their best-loved self.

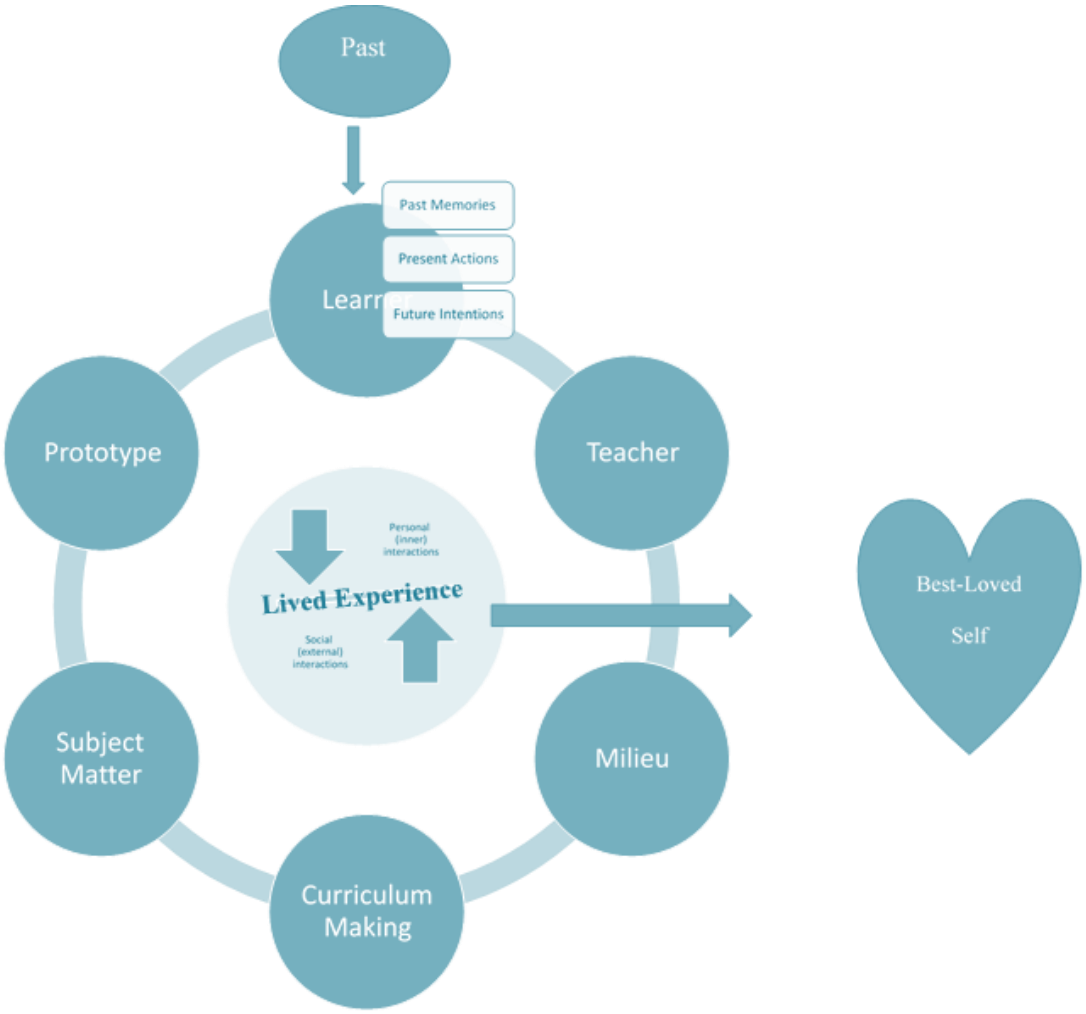

Figure 2.8 Conceptual framework for designing curriculum for living as your best-loved self.

2.1.4. Designing Curriculum for Knowing, Doing, Being and Becoming Your Best-Loved Self

Combining the prototypes explored thus far in the literature review and placing in the context of this research study, I developed the final prototype (for now) that will

serve as the conceptual framework for this dissertation. In utilizing this framework to guide this study, we will focus the literature review on the six commonplaces of curriculum (see Figure 9) as they relate to the research puzzles explored in this dissertation. For milieu or context, we will look at the literature on design-based learning experiences. For subject matter, the literature on transversal skills will be explored. A more narrow and contextual focus will be explored through teachers acting as coaches during DBL and a coach's role in developing transversal skills, the learner engaging in sensemaking through reflecting in and on action during DBL, and the embodied knowledge that exists within the prototypes created during DBL. The conceptualization of an education aimed at the outcome of creating learners that are living as their best-loved self will be discussed briefly through the lens of holistic education during the literature review and then more fully developed during article one in this three-article dissertation. Articles two and three will focus on the learner's perspective of their lived design-based learning experiences as a way to develop the transversal skills needed to live as their best-loved self.

Figure 2.9 Literature review framework prototype.

2.2. Literature Review

Design is considered to fill the space between art and science or theory and practice. "Design encompasses all these enterprises [science, technology, art], while also serving human purposes, giving it an added edge in helping [learners] develop pro-social values" (Sutton, 2000, p. 185). (Bronowski, 1973) wrote:

> among the multitude of animals that scamper, fly, burrow and swim around us, man is the only one who is not locked into his environment. His imagination, his reason, his emotional subtlety, and toughness make it possible for him not to accept the environment but to change it" (p. 19).

Design is future-focused, solution-focused, and human-focused. Designers embrace designerly ways of problem finding, problem setting, and problem-solving through the design of different artifacts (Cross, 1982). Designers utilize empathic skills, speculation, visualization, divergent idea generation, synthesizing, and prototyping to tackle ill-defined or "wicked problems" (Buchanan, 1992). Designers transform a holistic understanding of all stakeholders and prioritize the needs and wants of users to transform ideas into new, useful, and desirable solutions (Buchanan & Margolin, 1995). These design competencies are in "high demand in economies driven by the creation of innovative ideas because the transferability and efficiency of these competencies regarding innovation is a large competitive advantage in knowledge economies" (Teixeira, 2010, p. 411). With the promise of learning design competencies as a path to a better future, Cross (1982) claims that the behaviors of design can be learned is a crucial underlying belief for this study.

This literature review will begin with an overview of the history of design-based education and then utilized an adapted form of Schwab's commonplaces of curriculum to frame the remainder of the literature review: milieu, subject matter, teacher, learner, prototype, and curriculum-making. The literature review will conclude by connecting all the foundation pillars of this study through the lens of holistic education aimed at developing learners to live as their best-loved self.

2.2.1. A Look to the Past of Design-Based Education

A focus on design-based education began around the late 1960s and early 1970s'. In the early 1960s', London hosted the first "*Conference on Design Methods,*" and there has

been a steady growth from there in researching design (Cross, 2007)In 1970 in the United States, Wurman and Levy created a curriculum where students imagined and designed an urban environment. In 1970, the British government's School Council and Department of Education and Science established Design and Technology as a discrete subject area in schools. Continuing in the 1970s and the beginning of the 1980s, design-based curriculum emerged through Grave's Center for Understanding the Built Environment and Nelson's Center for City Building Education.

Nigel Cross (1982) published an article on "*Designerly Ways of Knowing*" that helped propel the idea that design education could be for more than just professional designers. In 1990, an article entitled "*Design Education in Crisis: The Transition from Skills to Knowledge*," brought to light the societal shift from valuing know-hows to know-whys of designing (Giard, 1990). In 1991, the British School Examination and Assessment Council (SEAC) under the leadership of Richard Kimbell, assessed national student achievement in design and technology. From his work on that project, Kimbell, Stables, Wheller, Wosniak (1991) defined design as "the purposeful pursuit of a task to some form of resolution that results in improvement (for someone) in the made world"...he went on to define the "made world" as the "products, systems, and environments in which they function" (p.18). His team was careful not to identify a design process because they felt design required a range of capabilities that should reflect the individual's creative working methods (Kimbell et al., 1991).

Meanwhile in the United States, following ten years of National Education Association (NEA) funding for the use of design in American classrooms, the National

Endowment for the Arts (1993) organized a two-year study of design in K-12 schools. From that study, Davis, Hawley, McMullan, & Spilka (1997) published the findings in a book called, *Design As a Catalyst for Learning*, including the results from 160 teachers surveyed and ten schools observed. The researchers, based on the teachers' anecdotical stories, claimed that utilizing design-based pedagogies produced adaptable and engaged learners, helped students navigate ambiguity, explore alternative outcomes, and communicate more effectively. One of the researchers' primary concerns was the lack of systematic ways of determining if there is any reportable improvement in content-based outcomes. In a review of the book, Sutton (2000) criticizes the book for lack of critical analysis of design as a method of inquiry and makes a call for inventing rigorous yet imaginative ways of "deciphering the nature and untapped potential of a designerly way of thinking" (p.185).

At the same time in higher education, a study was published on capstone engineering design projects, the authors (Todd, Magleby & Sorensen, 1995) found many undergraduate engineering programs were using design-based capstones to help students learn the professional skills that are difficult to develop in the technical courses. In 2001, Findeli wrote an article, "*Rethinking Design Education for the 21st Century: Theoretical, Methodological, and Ethical Discussion*," where he reimagined a design education that was not bounded by a discipline but rather taught as a meta-practice for humanistic values within complex systems. In 2006, the National Academy of Engineering and the National Research Council Center for Education established a committee on K-12 engineering to survey the implementation of engineering curricula in

the United States, how engineering has been incorporated into the STEM initiatives, and to identify important learning outcomes. From that committee research, the report, *Engineering in K-12 Education: Understanding the Status and Improving the Prospect* (2009), stated that a variety of perspectives exist on the purpose of engineering in the classroom, more research is needed on intersecting engineering with other content areas, and little consideration of the systemic changes needed for more effective engineering education in K-12 would be needed.

In 2013, the Next Generation Science Standards released a report on their commitment to integrating engineering design into the curricula at the same level of other disciplines, as well as stating their belief that "providing students a foundation in engineering design allows them to better engage in and aspire to solve the major societal and environmental challenges they will face in the decades ahead" (Next Generation Science Standards, 2013, p.1). Koh, Chai, Wong and Hong's (2015) book on design thinking in education concluded that more research was needed on how to utilize design thinking to support interdisciplinary learning, how to build dispositions for complex problem solving, and as a way to create experiences that foster 21st-century learning competencies. Koh et al. (2015) identified a few challenges with applying design thinking to the educational context: lack of evidence to show if the competencies for solving design problems translate to performance on the current high-stakes exams used for assessment, lack of understanding on how to scaffold to support learners and teachers in utilizing design thinking, and a lack of understanding on the design talk or Schon's reflection-in-action that occurs during the design process.

In 2017, Davis & Littlejohn made the claim that there is still a limited number of empirical research studies that confirm the outcomes of utilizing design-based pedagogies in the educational context, causing it to fall from the radar of educational policy or national attention as a method of practice. They also claimed that there is even less research on the curricular structure or development of educators to utilize effectively design-based pedagogies in the classroom. Despite the lack of research to fully support the role of design in education, advocates of design see it as a boundary-crossing discipline that could bring "imagination, humanistic values, and idealism" (Teixeira, 2010, p. 416).

2.2.2. Milieu: Design-Based Learning Experiences

For Schwab, milieu represented the context or environment where the learning takes place (Null, 2017). For Null, learning environment or milieu relates to the "psychology, sociology, and pedagogy of the contexts in which learning takes place and their influence on the pupil's achievement in the cognitive and affective domains" (p. 31). To more fully understand the complexity of design-based learning experiences, this section will begin with the definitions of design-based learning experiences followed by a synthesis of the characteristics of DBL environments found in literature and, lastly, the current perceptions on benefits and barriers to implementing DBL.

2.2.2.1. Defining Design-Based Learning (DBL)

Naidu (2007) claimed that design tasks are "excellent vehicles for learning" (p.252). Cross (2006) advanced design as a culture of learning and thinking, defining it as "the collected experience of the material culture, and the collected body of experience, skill

and understanding embodied in the arts of planning, inventing, making and doing" (p.1). As the value of design has been translated into the teaching and learning within the classroom, various methods or processes have emerged: Learning by Design (LBD™); Design-based science (DBS); PBS design squad model; IDEO design model; and Stanford d. school model. Regardless of the method or process, design-based learning experiences are believed to provide the opportunity for learners to engage in design, build understanding across disciplines, and apply the knowledge across disciplines in meaningful ways (Blasetti, 2010; Cross, 2006a; Fortus et al., 2004, 2005; Wagner et al., 2014; Wells, 2013). After looking across the definitions (see Table 1) and the characteristics of DBL learning environments (see Table 2), DBL will be defined, for the context of this study, as a problem-based team learning experience where learners utilize the processes of inquiry and reasoning and build knowledge-in-action through interactions and iterations as they move towards designing innovative artifacts, systems, and solutions.

Table 2-1 Definitions of Design-Based Learning (DBL)

Year	Source	Definition
2004	Fortus et al.	designing artifacts are to support students in constructing scientific understanding and problem-solving skills
2012	Gómez Puente, Van Eijck, & Jochems,	An educational approach grounded in the process of inquiry and reasoning towards generating innovative artifacts, systems, and solutions
2014	Gomez-Puente, Van Eijck, & Jochems	DBL builds upon those educational principles and uses real-life and hands-on design scenarios to construct new science knowledge in iterations and to develop inquiry reasoning skills while solving science problems.
2015	Gómez Puente, van Eijck, & Jochems	Design-based learning (DBL) is an educational approach in which students gather and apply theoretical knowledge to solve design problems. DBL is rooted in active learning methods that facilitate students' learning processes. Five dimensions are relevant to the context of DBL.: project characteristics, design elements, role of the teacher, assessment, and social context
2016	Chen & Chiu	Teaching and learning method based on constructionism and grounded in the process of inquiry and reasoning toward designing innovative artifacts and solutions
2018	Smith	Type of problem-based learning pedagogical approached rooted in constructionism, which asserts the belief that hands-on activities can provide personally meaningful contexts for learning because the learner builds his or her own knowledge during the process and benefits from sharing that learning with others

Table 2-2 Characteristics of Design-Based Learning (DBL)

Characteristics	Sources
Utilize prior knowledge	Goel & Pirollie, 1992; Perez et al. 1995; Doppelt, Mehalik, Schunn, Silk, & Krysinski, 2008
Experiments with solutions, explores possibilities, ideation, imagination	Rowland, 1993; Cross, Christianns & Dorst, 1994; Casakin & Goldschmidt, 1999; Dorst & Cross, 2001; Roberts 2001; Dym et al., 2005; Cross, 2006; Atman et al. 2007; Doppelt et al. 2008; Cross 2008; Lawson & Dorst, 2009
Creating knowledge-in-action	Goel & Pirollie, 1992; Dorst & Cross, 2001; Smith, 2018
Real-life, authentic	Hirsch et al., 2001; Massey, Ramesh, & Khatri, 2006; Van Til et al., 2009; Gómez Puente, van Eijck, and Jochems, 2011, 2013
Team-based/Collaborative	Kolodner, 2002; Denayer et al., 2003; Doppelt et al., 2008; Chang, Yeh, Liao, & Chang, 2008; Ke, 2014; Gomez Puente, van Eijck, & Jochems, 2015
Critical thinking/Creative problem-solving/decision making	Archer, 1984; Sowa; 1991; Barak & Doppelt, 1999; Mehalik & Schunn, 2006; Doppelt, 2009; Petrich, Wilkinson, & Beven, 2013; Gomez Puente, van Eijck, & Jochems, 2015; Ryan, Clapp, Ross & Tishman, 2016
Utilize professional skills and domain knowledge skills	Ke, 2014; Gomez Puente, van Eijck, & Jochems, 2015; de Vries, 2006
Iterative design of an artifact/prototyping/use of sketching or modeling	Archer, 1984; Roozenburg & Cross, 1991; Kolodner et al. 2003; Fortus et al. 2004; McKenna, 2006; Cross, 2006; Gomez Puente et al. 2013; Bekker et al., 2015
Open-ended, ill-defined, ambiguity	Simon, 1973; Archer, 1979; Sowa, 1991; Goel & Pirolli, 1992; Jonassen, 1997, 2000; Nelson & Stolterman, 2003; Kolodner et al. 2003; Fortus et al., 2005; Cross, 2006; Mese, 2006; Gómez Puente, van Eijck, and Jochems 2011, 2013, 2014
Hands-on	Papert & Harel, 1991; Gómez Puente, van Eijck, and Jochems 2011, 2013, 2014; Peppler et al. 2016
Problem/project-based learning	Hmelo, Holton & Kolodner, 2000; Nelson & Stolterman, 2003; Smith, 2018
Interdisciplinary	Kafai, Peppler, & Chapman, 2009; Gómez Puente, van Eijck, and Jochems 2011, 2013, 2014
Synthesis/Constructive thinking	Rowland, 1993; Goel & Piroli, 1992; Cross, 2006

2.2.2.2. Benefits of DBL

In 2003, Kolodner et al. utilized DBL within the science curriculum and found that both high and low achievers increased their knowledge-based for the science content, helped to focus learning and provided opportunities for applying skills. In 2014, Duran, Höft, Lawson, Medjahed, & Orady explored the impact of team DBL on high school students learning and found a significant effect on STEM-related skills and a deeper understanding of the content. A few additional studies confirm the positive impact DBL has on developing content knowledge (Fortus et al., 2005). Other researchers have shown that DBL helps with developing higher-order cognitive skills (Barak & Doppelt, 1999; Kim et al., 2015) as well as encouraging team creativity (Trilling & Fadel, 2009). DBL has been shown to be an effective way to integrate content, pedagogy, and technology in a way that positively impacts student learning (Chen & Chiu, 2016; Koehler et al., 2004; Koehler & Mishra, 2005). In addition to positive cognitive impacts, researchers have found that DBL has the potential to increase student motivation, foster interpersonal behaviors, and promote self-regulated behaviors (Barak & Raz, 2000; Doppelt, 2003; Marulcu & Barnett, 2013) Other studies have shown that by allowing students to solve problems creatively, they have higher self-esteem and take more responsibility for their learning (Beetham & Sharpe, 2013; L. Waks, 1995). Students exposed to DBL are more likely to have an interest in learning about STEM and pursuing STEM-related careers (Mehalik et al., 2008).

2.2.2.3. Barriers to DBL

Based on a national study, only 7% of secondary educators and 4% of elementary educators felt prepared to teach engineering and design concepts (Smith, Banilower, Nelson, & Smith, 2013). Additional research on teacher perceptions of teaching engineering has shown that teachers lack subject matter knowledge, have misconceptions about the discipline, have limited training with effective instructional practices, and encounter difficulty in managing the resources and time (Brophy et al., 2008; Davis et al., 1997; Diefes-Dux, 2014; Fulkerson & Banilower, 2014; Trygstad et al., 2016). While engineering has the potential to bring interdisciplinary learning into the classroom, teachers often struggle with making those connections to other content areas explicit (Davis et al., 1997; Henriksen, 2018; Mishra et al., 2015). To embrace design-based learning, teachers must embrace working in uncertain conditions and tolerating ambiguity (Combs et al., 2009; McDonnell, 2012). From the student perspective, barriers to DBL could be negative views of working in collaborative environments, often stemming from past experiences with group members that do not contribute equally (Carroll, Goldman, Britos, Koh, Royalty, & Hornstein, 2010; Snyder, 2010). Students also find the amount of time to complete a design-based learning experience a barrier (Carroll et al., 2010).

2.2.3. Subject Matter: Transversal Skills

With the benefits of DBL beyond just academic achievement outcomes, this next section explores the literature on the transversal skills evident in design-based learning experiences. For this study, transversal skills are defined as "skills that are typically

considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings" (UNESCO IBE 2013). Across the literature, transversal skills are also referred to as soft skills, non-technical skills, social and emotional skills, leadership skills, emotional intelligence, 21st century skills, etc. in both research-based articles and practitioner-based articles. Literature agrees these skills are critical for a learner to succeed in the future, but how to effectively teach those skills is debated. In a report called, *Maximizing the Impact: The Pivotal Role of Technology in a 21st Century Educational System* (Busch et al., 2008), the team claimed that "even if all students mastered core academic subjects, they still would be woefully under-prepared to succeed in post-secondary institutions and workplaces, which increasingly value people who can use knowledge to communicate, collaborate, analyze, create, innovate, and solve problems" (p.3). Pink (2005), with his best-selling book, *A Whole New Mind*, helped to spread the idea of the importance of transversal skills, such as empathy, imagination, creativity, systemic thinking, and visualization because of the impact it would have on future employment.

Ironically, in 1918, Mann published *A Study of Engineering Education*, which included results from a study that asked 1500 engineers, "what are the most important factors in determining probable success or failure in engineering" (p.106). The response was related to personal qualities seven times more frequently than technical expertise. The survey was then sent to over 30,000 members of engineering societies and had a response rate of 7,000 engineers. This time the engineers were asked to order by importance, character, judgment, efficiency, understanding of men, knowledge, and

technique for being successful in engineering. Responses declared character at the top of the list and technique at the bottom of the list. Based on those results, Mann encouraged schools not to neglect the wholeness of the students and cautioned that while character could not be taught in the same way as the technical skills of engineering, it needed to be fostered. Mann (1918) continued a step further and said:

> The growth of these essential characteristics in students may be either fostered and encouraged or inhibited and discouraged by the manner in which the school is organized, and the subject-matter presented. (p. 107)

Just as Mann (1918) was calling for the restructuring of school or curriculum to focus beyond the technical to the personal development of engineers, and Bruner (1979) was claiming that students needed more time discovering the unknown instead of learning what is known, many like Pink (2005) are still calling for a focus on skills beyond technical expertise within our education system. In a project partially funded by the European Commission, *Assessment of Transversal Skills 2020* (ATS, 2017), looked to create a framework or model on enhancing student's transversal skills within curriculum and provide tools for the development and assessment of these skills (report). In developing their framework, they looked across the transversal skills of many other frameworks that have been developed. A summary of those various frameworks (see Figure 10) was captured as a way of exploring the depth of transversal skills.

Figure 2.10 A look across transversal skills embedded in 21st century frameworks.

2.2.3.1. Transversal Skills within Emotional-Social Intelligence

One measure of transversal skills for this study will be through the lens of emotional-social intelligence. In 1920, Thorndike used the word social intelligence, and later in 1983, Gardner discussed interpersonal intelligence as a way of capturing our ability to understand others and engage in wise relationships with others (Daniel Goleman, 1995). Social Intelligence involves navigating our social environment (Abe,

2011)through relational interactions. Building of these earlier works, emotional intelligence was coined by two psychologists, Peter Salovey and Jack Mayer (1990), and later popularized by Daniel Goleman (1995) who has defined it as "how well we sense and handle our emotions and those of others" (Goleman, 2001, p.144). Emotional Intelligence consists of competencies and skills that are believed to impact managerial performance (Boyatzis, 2001). Emotional-social intelligence, a term preferred by Bar-On, begins with self-awareness and understanding oneself to make sense of our inner experiences (Abe, 2011), as well as a focus on the individual to help create the conditions and capacity for change and self-actualization (Bar-On, 2010). Bar-on (2006) uses the term emotional-social intelligence (ESI) because he finds there to be intrapersonal and interpersonal components. Bar-On (2010) found that higher levels of emotional-social intelligence have a significant effect on human performance, happiness, well-being, and the quest for the meaning of life. While emotional intelligence can be learned and improved upon (Mocanu & Sterian, 2013; Turner & Lloyd-Walker, 2008), it is often overlooked or put at a lower priority than "technical" or academic intelligence (Jones et al., 2013). Ability model measurements which are determined by performance-based measures, such as Mayer, Salovey, Caruso's *Emotional Intelligence Test (MSCEIT)* (2002) and mixed-model measurements which are determined by self-report, such as Bar-On's (1997) *Emotional Quotient Inventory (EQ-i)* are both used in research studies to measure emotional intelligence. Research comparing the models has found a low correlation between the different assessments, leaving some to conclude that they measure different constructs (Brackett & Mayer, 2003; Livingstone & Day, 2005; Rooy

et al., 2005). Additional research has found that ability models are more correlated with cognitive ability, whereas mixed models are more correlated with personality (Rooy et al., 2005). Just as there are differences in assessments for emotional-social intelligence exist, different models (see Table 3) of emotional intelligence exist Mayer & Salovey (1997); Goleman (1998; 1995); and Bar-On (1997).

Table 2-3 Models of Emotional-Social Intelligence

Mayer & Salovey (1997)	Goleman (1995, 1998)	Bar-On (1997, 2004, 2006)
	Definition	
ability to perceive emotions; to access and generate emotions to assist thought; to understand emotions and emotional knowledge; to reflectively regulate emotions to promote emotional and intellectual growth	Includes self-control, zeal and persistence, and the ability to motivate oneself…being able to reign in emotional impulse, read another's innermost feelings, handle relationships smoothly	An array of non-cognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures
	Skills/Competencies	
• Perceive or sense emotions • Use emotions to assist thoughts • Understand emotions • Manage emotion	• Self-Awareness • Self-Regulate • Motivation • Managing Relationships • Displaying Empathy	• Self-Perception • Self-Expression • Interpersonal • Decision Making • Stress Management

While considered to be "broad-based and good," critics of mixed models, specifically Bar-On's (1997) model is that it is "not purely measuring emotional intelligence, as it is focused more on adaptive functioning such as social skills, coping with stress, [and] motivation" (Kanesan & Fauzan, 2019, p. 5). For this study, the need to measure the theoretical construct of emotional intelligence solely does not exist,

because we are using the term transversal skills, which includes all the dimensions measured on this assessment. Bar-On (R. Bar-On, 2000)refined his model into a 1-5-15 factor structure (see Figure 10). It measures one overall total EI score, five composite scores with each measure having three distinct aspects of emotional and social functioning. It also includes a well-being indicator, that is considered to both contribute to and be a product of emotional-social intelligence; it is calculated using the self-regard, self-actualization, optimism, and interpersonal relationship subscales.

Figure 2.11 Bar-on's model of emotional intelligence.

Each of the five composite scores is then broken down into three social-emotional or transversal skills (see Table 4).

Table 2-4 15 Subscales of the EQ-i 2.0

Subscales	Definition
Self-Perception Composite	
Self-regard	Respecting oneself, confidence
Self-Actualization	Pursuit of meaning self-improvement
Emotional Self Awareness	Understanding own emotions
Self-Expression Composite	
Emotional Expression	Constructive expression of emotions
Assertiveness	Communicating feelings, beliefs; non-offensive
Independence	Self-directed, free emotional dependence
Interpersonal Composite	
Interpersonal Relationships	Mutually satisfying relationships
Empathy	Understanding; appreciating how others feel
Social Responsibility	Social consciousness; helpful
Decision Making Composite	
Problem Solving	Find solutions when emotions are involved
Reality Testing	Objective; see things are they really are
Impulse Control	Resist or delay impulse to act
Stress Management Composite	
Flexibility	Adapting emotions, thoughts and behaviors
Stress Tolerance	Coping with stressful situations
Optimism	Positive attitude and outlook on life
Well Being Composite	
Happiness	Satisfied with life content

Emotional intelligence has the potential to be developed (Abraham, 2004; Goleman, 1995) and research supports that one can learn, develop and grow in transversal skills over time (Abraham, 2004; Nelson & Low, 1995; Wang et al., 2011). Based on the social aspects of teamwork and creative elements of design, many transversal skills, such as communication, collaboration, critical thinking, creativity, emotional self-control, emotional understanding, empathy, interpersonal relationships, and emotional self-awareness are considered highly crucial for their success in the field,

but many claim that these skills would not be learned in traditional methods focused solely on technical objectives (Chisholm, 2010).

2.2.3.2. Transversal Skills Through Design

Running parallel with the need to develop transversal skills in engineers to enhance their success in the professional context because of the team-based, creative and stressful conditions, design-based learning research is finding support that design activities are a potential way to foster transversal skills (Elegbe, 2015; Lee & Breitenberg, 2008; Price, 2009). Razzouk and Shute (2012) make the leap and suggest that "design thinking is more than just a skill to be acquired and used in limited contexts. Rather, we view it as a way of thinking and being that can potentially enhance the epistemological and ontological nature of schooling" (p.343). When one grows in their skills in design, they will be more effective at communication, collaboration, creativity, critical thinking, holistic thinking, empathy, imagination, and visualization (Cross, 1982; H. Lee & Breitenberg, 2008; Lewis & Bonollo, 2002). Davis et al. (1999) interviewed teachers on utilizing design in the classroom and found that they support design for the following reasons: building flexible thinking skills, developing interpersonal and communication skills, and cultivating responsible citizens (p.19). Doppelt et al.'s study (2008) of eighth grade students engaged in a DBL environment, found that students developed communication, presentation and problem-solving skills. Rowland (1993) suggested that design has the potential to teach us "human factors such as communication, power, and anxiety as well as any conflict of interest that arises" (p.82). Davis and Littlejohn (2017) claim that DBL has the strong potential to develop

transversal skills, but Oxman (2001) found that to develop those skills there would need to be a shift from emphasizing the product to a more fine-tuned focus on the process of design learning. While more studies are emerging on developing transversal skills through design, more research is needed on how we might best utilize design-based learning to develop these skills.

2.2.4. Teacher: Coach During DBL

As maintained by Stober and Grant (2006) coaching is solution-focused (so is design), supports reflective learning and practice (needed for design) and is often aimed at the professional performance and personal growth of the learner. The International Coach Federation (ICF) says, "coaching is partnering with [learners] in a thought-provoking and creative process that inspires them to maximize their personal and professional potential" (2010, n.p.). One mainstream use of coaching is leadership coaching or coaching leaders (often executives) to help refine and shape their leadership (transversal) skills (Goldsmith & Lyons, 2006; Moen & Federici, 2012). The Chartered Institute of Personnel and Development (2007) finds that coaching is non-directive, focuses on performance and related skill development, and focuses on the individual, team, and organization and the interconnection among the groups where they belong and the groups with whom they interact. Research has shown positive outcomes that emerge from coaching are improving goal setting, improved-on-the-job performance, increased well-being at work, improved communication, improved self-regulation, self-efficacy, resilience, and academic improvement in students (Dunst et al., 2018; Gaddis & Foster, 2015; Gregory & Wiles, 2018; Grover & Furnham, 2016; J. Lee, 2017; Stober & Grant,

2006; Theeboom et al., 2014; Thompson, 2019). Casado, Lopez-Fernandez, Lapuerta (2016) claim that the combination of learning about emotional intelligence and coaching for EI can increase engineering students' emotional quotient.

2.2.4.1. Coaching for Transversal Skills

In a recent article by van Diggelen, Doulougeri, Gomez-Puente, Bombaerts, Dirks, and Kamp (2019), they used the grounded theory approach to create a model for coaching in design-based learning. The authors searched the literature on coaching in problem-based learning and the studio model from arts and designs with the keywords coaching, innovation, creation, design, and problem-based learning. After analysis, van Diggelen et al. (2019) formulated a coaching model (see Figure 12) based on goal-directed coaching around designing, design process and thinking, self-regulation, and professional identity; the importance of the environment; the importance of dialogue between teachers and students (n.p.).

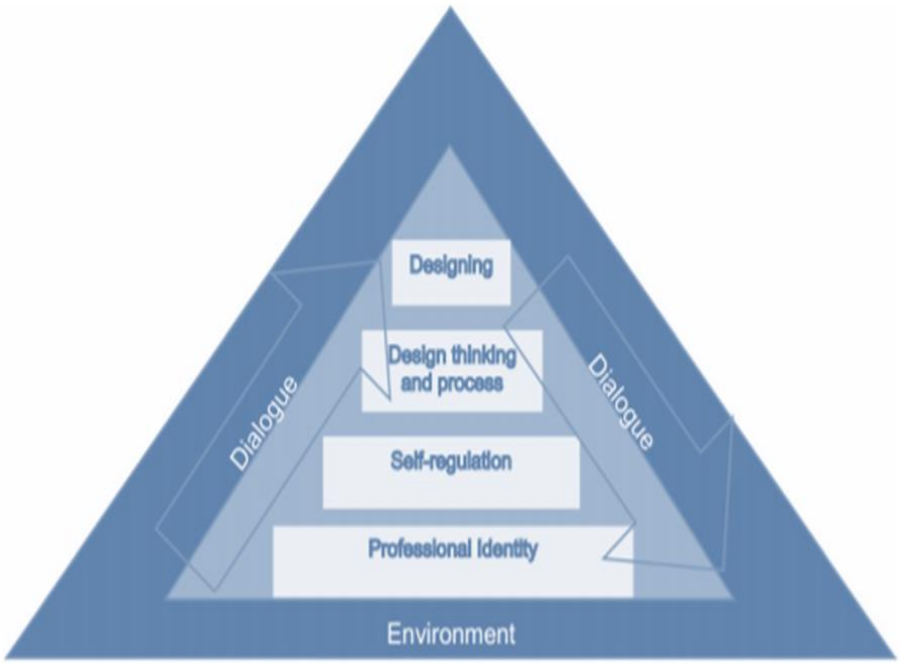

Figure 2.12 van Diggelen et al. (2019) coaching model.
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Adopting a holistic approach to coaching during DBL, the authors focused not only on the content of the DBL but on the environment (*milieu*), the *learner* through developing identity and self-regulation and the *teacher* through dialogue. In discussing the environment, "student learning in DBL can be characterized by openness, uncertainty, learning by doing, and learning by mistakes" (van Diggelen, 2019, n.p) which in turn makes DBL "very personal for students, can be confronting, and give rise to all kinds of affective responses by students" (n.p.). To learn in those conditions,

coaches must provide “a safe and yet stimulating environment” where students can “open up and feel free to express themselves and to dare to learn from mistakes” (n.p.).

Schön (1987) sees design teachers as coaches who know operational moves, along with ways of thinking and talking during the negotiated tensions of design problems. In designing alongside the learner (apprentice), Schon (1987) sees coaches as having three tasks:

- Use words, demonstrations, or descriptions to help novices deal with the situations that arise
- Particularizing their approach to the individual learner's needs, engaging in dialogue with the learner
- Understand the relationship dynamics with the learner so that they can deal with the negative emotions experienced during the design process

When the coach engages in the reciprocal reflection-in-action, the teacher and the learner work side-by-side to ‘negotiate the ladder of reflection’ by making moves, talking about the moves and even talking about their talk about the moves (meta-reflection) to help novice designers confront the messy, unanticipated problems that arise in professional design practice (Schon, 1987). By coaching through DBL, the coach can help the learner see how their past, personal experiences, beliefs, and behaviors influence the affective components of the design process (Hutchinson & Tracey, 2015). By focusing on coaching around identity in their model, van Diggelen et al. (2019) will help the learner explore how “the integration of one’s personal traits, motives, competencies, values, morals, beliefs, and attributes with the norms of the profession and technical knowledge” (n.p.). When coaching for identity development through DBL experiences, we can begin to see the potential of how DBL can be used for growing transversal skills in students. Assuming a wider approach to learning outcomes (Jarvis,

2006) and including identity (Lund Dean & Jolly, 2012; van Diggelen et al., 2019) along with other broad outcomes focused on transversal skills (Jamaluddin et al., 2019; Price & Cordove-Wentling, 2009), emotion (Depaoli et al., 2017; Freedman & Jensen, 2007; Gendron, 2017; Jones & Kahn, 2018) and values or beliefs (Painter-Morland & Slegers, 2018; Scheupflug & Asbrand, 2006; Turan & Bozkurt, 2017) we can begin to reimagine how to best utilize the richness of DBL experience as the vehicle for learning.

2.2.4.2. Learner: Sensemaking through Reflection

Dewey (1933) found deep learning to be a careful and structured reflection. Schon (1983), a professional designer, brought forth the ideas of reflection-in-action. Despite the notion of reflection-in-action coming from the profession of design, Adams, Turns, and Atman (2003) find little research on engineering design or engineering design education and reflection. Jarvis (2012) argues that it is our human capacity to co-construct meaning that gives us understanding, and ultimately, 'human beings are lifelong learners...seeking meaning for their existence' (p. 29). While experiences are critical to learning, it is the reflection on the experiences where the learning takes place and helps us continue our path to be lifelong learners.

2.2.4.3. Schon, Reflection and Design

Schon's background was in philosophy, and he came at design from a pragmatist or practical view. In his pioneering work, *The Reflective Practitioner* (1983), Schon argued the role of technical knowledge versus 'artistry' in developing professional excellence. Schon (1983) develops "an epistemology of practice implicit in the artistic, intuitive processes which some practitioners bring to situations of uncertainty,

instability, uniqueness and value conflict" (p. 49). With a practical lens, Schon saw design as the relation between the creation and the reflection upon that creation, which allows for iterative improvements and re-creations. For Schon, reflection was not separate from design practice but was a part of the practice. In practical environments, people (managers) find themselves making decisions amidst uncertainty through intuition; the capacity for this type of decision making is developed from practice rather than studying theory. To engage this gap between theory and practice, Schon's contribution of reflection-on-action and reflection-in-action is considered a significant contribution to the field of design and has gone on to be adapted to other professional fields, including education (Joyce Hwee Ling Koh, Chai, Hong, & Tsai, 2015; Waks, 2001). Design professionals are often confronted with complex situations where the knowledge from the textbook or formal education is useful but not sufficient, causing the designer to rely on his notion of reflection-in-action as they make strategic moves to navigate the situation (Koh, Chai, Wong, & Hong, 2015). This strategic-in-action approach brings to light a sort of "knowing-in-action," improvisation, or "knowing more than we can say" (Schon, 1983, p.51). "The notion of reflection-in-action is meant to capture the artistic and creative ways in which competent professionals negotiate the twists and turns of complex situations" (Koh, Chai, Wong & Hong, 2015, p. 22) or what Schon (1983) refers to as 'back talk' or a conversation with the situation (p.5). Henriksen, Cain, and Mishra (2018) call for a reflective practice mindset, grounded in the work of Schon. Reflection-in-action and on-action (Schon, 1983, 1987) help

students to not only evaluate their work along the way but to begin training the necessary 'habits of mind' that are needed to engage in the design thinking process.

2.2.5. Prototype: Embodied Knowledge

Instead of calculating a solution, the creation of artifacts as the solution is a central component of design-based learning. In his pioneering work, *The Science for the Artificial* (1969/1996), Simon ascertained that design was "the principal mark that distinguishes the professions from the sciences" (p.11), defining design as "the transformation of existing conditions into preferred ones" (p. 4). Critical to the cognitive-based theory of design, is his perspective that an artifact is a 'meeting place' or 'interface' between an 'inner' environment and 'outer' environment. If the 'inner' environment (substance and organization) is appropriate to the 'outer' environment (context it will be used in), then the artifacts can be considered purposeful (Simon, 1996, p. 7-9). Researchers have looked at how designers interpret, construct and manipulate multiple prototypes (artifacts) in the learning process (Ainsworth, 1999; de Vries, 2006; Reimann, 1999; Schnotz & Lowe, 2003). Bilkstein (2014) ascertained that DBL promotes deep learning because "physically constructing an object is both a context for learning and an expression of learning" (p.1). Jeantet (2018) stated that communicating about the future imagined artifact depends heavily on mediation through design representations (prototypes), a simultaneous construction of imagining and thinking about the prototype in mind and representing the prototype through some graphical intermediaries (de Vries, 2006)

2.2.5.1. Making Thinking and Learning Visible Through Embodied Knowledge of Prototypes

Kimbell and colleagues took on a research endeavor to find effective means of assessing learning and the final product within DBL experiences. From that work, Kimbell and Stables (2007) created a graphic (see Figure 13) that shows the constant boundary-crossing from mind to hand. In an attempt to capture evidence from the ephemeral, largely invisible thinking elements of design, as well as how that thinking shows up in the prototype, the researchers started asking very structured and precise prompts that would target those thinking elements.

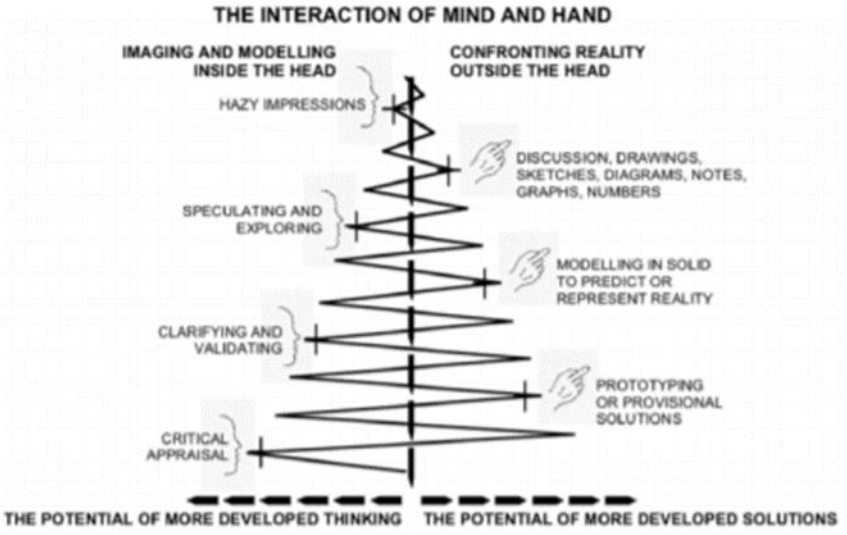

Figure 2.13 The interaction of mind and hand.
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Oxman (2002) claimed that as students created prototypes or visual representations of their design thinking, they were increasing their ability to think in

designerly ways, allowing her to agree with Papert's (1991) notion that this design-based education could allow for a form of education that contributes to "knowing rather than to knowledge" (Oxman, 2001, p.282), which relates back to Dewey's belief on knowing and the known (Dewey & Bentley, 1949). Waks (2001) suggests that "to design is to discover a framework of meaning in an indeterminate situation through practical operations in the situation" (p.44). Since design grew from practice instead of theory, it values knowing through the experience of trial and error instead of intellectual analysis (Kimbell & Stables, 2007). Situated as this space between theory and practice, Latta and Buck (2008) maintain that "the gaps persistently wrestled with between theory and practice is embraced through embodied knowledge" (p.323). Building off of Latta and Buck's notion of embodied knowledge as the connection between theory and practice, Bresler (2006) claimed that the space between theory and practice was experience and it could only be addressed through the intersection of the persons' thinking, feeling, doing, and being. Craig et al. (2018) defines embodied knowledge as "not simply knowledge of the body, but knowledge dwelling in the body and enacted through the body" (p.329). If we imagine that enactment in DBL, we can see the transfer of knowing as it is enacted through the body into the design or enactment of the artifact.

2.2.6. Curriculum Making: Creative Decision Making

Schwab (1969) first used the word, curriculum maker, and that image was later used to contrast the teacher as an implementer of the predetermined objectives and materials with the image of a curriculum maker where one feels empowered to create curricula based on the desiderata of the teacher, learner, subject matter and milieu

(Clandinin & Connelly, 1995; Craig, 2002; Curtner-Smith, 1999; Schwab, 1969). Empowering teachers to negotiate those tensions between the teacher, learner, milieu, and content provide them the space for creative decision making in designing the curriculum, through a 'commitment to deliberation' that is neither deductive nor inductive (Schwab, 1969). Schwab (1969) stated that

> it cannot be inductive because the target of the method is not a generalization or explanation, but a decision about action in a concrete situation. It cannot be deductive because it deals with the concrete case and not abstractions from cases, and the concrete case cannot be settled by mere application of a principle, for almost every concrete case falls under two or more principles, and is not, therefore, a complete instance of either principle. (p.20)

In design, one would use deductive reasoning as they utilize convergent thinking too narrow in on the "best" solution for now and inductive reasoning as they use divergent thinking to create or generate possible solutions. Still, many designers accept the well-known Philosopher, C.S. Peirce's view that design requires another form of reasoning, which he named abductive reasoning. According to Cross (2013), Peirce (quoted by March) suggested that "deduction proves that something must be; induction shows that something actually is operative; abduction merely suggests that something may be." When faced with ill-defined problems (Cross, 2013, p. 19), much like we see in education, design must be utilized. As quoted by Cross (2013), Thomas and Carroll (1979) wrote, "design is a type of problem-solving in which the problem solver views the problem or acts as though there is some ill-definedness in the goals, initial conditions or allowable transformations" (p.19).

Schwab (1983) considers teachers to be 'the fountainhead of…curriculum decisions (p.24), who "must be involved in debate, deliberation and decision making about what and how to teach" (p.245) and who, not only in the pre-planned curriculum but in 'moments of choice' constantly arising from the intersecting interactions of teacher, learner, subject matter and milieu within the school day.

Clandinin and Connelly (1992) reconstructed their image of teacher as curriculum maker through ideas from Dewey, Jackson, Schwab, and Eisner. Acknowledging that Dewey never officially discussed teacher as curriculum maker, Clandinin and Connelly (1992) saw his foundational views on experience, life as education, beliefs around teachers playing active and creative roles, and a vision of not only personal growth but social growth as being critical to the image of teacher as curriculum maker (p. 378-379). Jackson's focus on morality in research and the moral quality of teaching caused him to view educational research with frustration, as it attempted to figure out what 'ought to be happening' instead of 'what actually happens in classrooms' (Jackson, 1966, p. 8). Jackson's (1968), *Life in Classrooms*, work has become foundational to teacher stories. Schwab brings the idea of teacher agency to the writings on curriculum:

> Teachers will not and cannot be merely told what to do. Subject specialists have tried it. Their attempts and failures I know at first hand. Administrators have tried it. Legislators have tried it. Teachers are not, however, assembly line operators, and will not so behave. Further, they have no need, except in rare instances, to fall back on defiance as a way of not heeding. There are thousands of ingenious ways in which commands on what and how to teach can, will, and must be modified or circumvented in the actual moments of teaching. Teachers practice an art. Moments of choice of what to do, how to do it, with whom and at what pace, hundreds of times a school day, and arise differently every day and with every group of students. No command or instruction can be so formulated as

> to control that kind of artistic judgment and behavior, with its demand for frequent, instant choices of ways to meet an ever-varying situations. (1983, p. 245)

Eisner's (1988) work put the value of teacher agency in the context of how researchers and teachers should work alongside each other to listen to teacher stories as they are told and lived in practice, so that "we can [begin] to see and describe the minor miracles of stunning teaching instead of prescribing how teachers should go after their work" (p. 392). As Clandinin and Connelly (1992) look forward, they place their wish about knowing teacher knowledge, in the words of Johnson (1989):

> [the] very way they construct reality as they live it through their embodiment, with all its tempos, moods, patterns, and projections. No verbal and intellectualized account of the teacher's beliefs could ever do justice to the experienced reality of this web of experiential processes that constitute the teacher's knowledge-in-process. (p.312)

In enacting Clandinin and Connelly's wish of seeing teachers as curriculum makers, we move from only being interested in what they know and do, to seeing it as a way of being in the world (Clandinin and Connelly, 2000).

2.2.6.1. A Designer's Mindset

> Curriculum making is a fundamentally practical and problem-solving enterprise in which teachers continually negotiate tensions arising from people having different interests, values, histories and politics, each of which has a stake in the reflected curriculum (Oh et al., 2013, pp. 244–245).

Teaching as design has increasingly been accepted among scholars, but many teacher education programs still spend very little time developing design expertise (Laurillard, 2012; McKenney et al., 2015). With researchers attempting to develop a knowledge base for building teachers' design expertise (Koehler, M., Mishra, P., Yahya,

2007), many of the studies are grounded in the systematic approaches from the field of instructional design (Hoogveld et al., 2001, 2005), which fail to capture the contextualized ways teachers intuitively approach design challenges in the classroom (Boschman et al., 2014; S. M. Gómez Puente et al., 2013; Goodyear & Dimitriadis, 2013; Kerr, 1981; McKenney et al., 2015a). A more contextualized view of design, as seen in other disciplines, is gaining momentum in the field of education, spurring an interest in the design processes that promote creative thinking alongside analytic thinking (Razzouk & Shute, 2012). Engaging in design involves "tacit and explicit aspects of knowing…across situations and contexts, including the capacity to learn to design in new, unfamiliar situations" (McKenney et al., 2015, p.183). Simultaneously various types of thinking (see Figure 14) are happening during creative decision making in the design process.

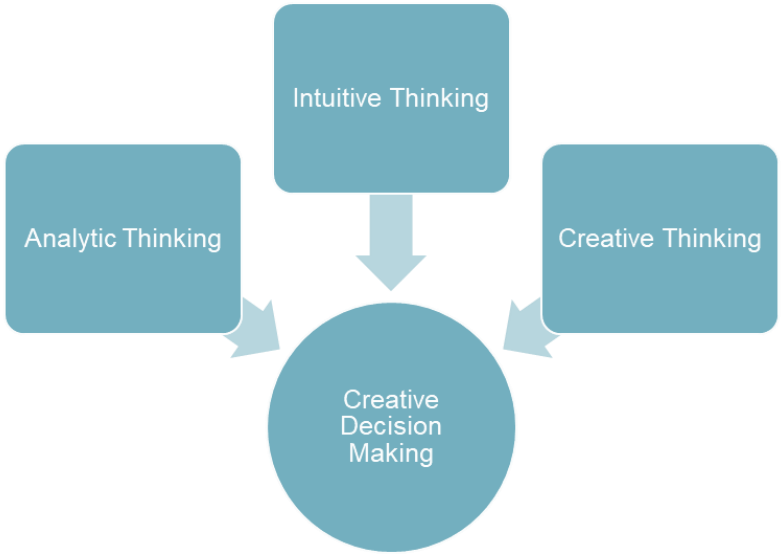

Figure 2.14 Creative decision making during the creation and enactment of DBL

When teachers design, they are not only intuitively addressing the practical concerns within the classroom; they are also influenced by their personal practical knowledge, beliefs, and external forces (Boschman et al., 2014). This process of thinking about the problem and solution from a designer's mindset is what Schon (1983) calls 'a reflective conversation with the situation'. He goes on to describe this conversation as follows: "[The designer] shapes the situation in accordance with his initial appreciation of it; the situation 'talks back', and he responds to the "back-talk" (p.5). Competent practitioners are always reflecting "in" and "on" their practice, which Schon coined, "reflection-in-action" and "reflection-on-action" (Schon, 1983). In "reflection-in-action," "doing and thinking are complementary. Doing extends thinking in the tests, moves, and probes of experimental actions, and reflection feeds on doing and its results. Each feeds the other, and each sets boundaries for the other" (Schon, 1983, p. 280). Examining the curriculum maker through the lens of design, we can see how the teacher is in the iterative process of thinking and doing as they move back and forth from ideas to prototypes, while reflecting-in-action and making creative decisions.

2.2.7. DBL Experiences as a Curricular Vehicle to Our Best-Loved Self

When one sees curriculum as the total learning experience of the individual (Dewey) and not solely as learning the subject-area content, it propels them to look at curriculum from a designer's mindset, which in turn leads them to think of curriculum more holistically. Embracing a design thinking mindset includes "human-centeredness, empathy, mindfulness of process, a culture of prototyping, a 'show don't tell' approach, bias towards action and radical collaboration" (McKenney et al., 2015b, p. 186). An

awareness of self (mindfulness) and an awareness of others (empathy) through reflection are central constructs of Emotional Intelligence (Bar-On, 2010; Goleman, 1995). In utilizing DBL experiences in a way that goes beyond the rational and measurable ways of knowing and embraces perception, physical sensations, and emotions as ways of knowing, doing, and being, we can begin to reimagine a more holistic education. When designing curriculum or educational experiences, one must consider all four of the underlying principles of holistic education. Principle one addresses the development of the whole person, specifically the process of self-actualization and learning that combines an individual's mental, physical, social, emotional, and spiritual growth (Nava, 2001). While focused on the individual, holism remains connected to the bigger picture through principle 2, that humans are an interconnected system, and any change to one will bring change to all (von Bertalanffy, 1998). Interconnectedness is discussed on three levels: intrapersonal, interpersonal, and transpersonal. A focus on only one connection or relationship would fail to achieve true learning because "from a holistic perspective, true learning is said to have occurred when educational or life experiences (principle 3) elicit a transformation of consciousness that leads to a greater understanding of and care for self, others, and the [global and local] community (principle 4)" (Johnson, 2015). If we were to achieve that outcome of a better care for self, others, and the community, we could potentially see the results that align with Bar-On's (2010) findings that higher levels of emotional intelligence have a significant effect on human performance, happiness, well-being, and the quest for the meaning of life.

Cultivating a designer's mindset through DBL as part of the holistic education journey, one can begin to embrace the potential to design or re-imagine our best-loved self.

With limited research connecting the foundations of this study, design-based learning, transversal skills, teachers as coaches, reflective learners, embodied knowledge of prototypes, and creative decision making as one journeys to their best-loved self, this study seeks to value the participants experience to gain insight into the intersecting ideas.

2.3. Methods

Narrative inquiry is an experiential methodology that begins "with an interest in a particular phenomenon which could be understood narratively…and try to make sense of the practice from the perspective of the participants, researcher and practitioner" (Clandinin & Connelly, 1989, p.14). Built upon the belief that education is experience and ongoing experience is life (John Dewey, 1938) and that experience happens narratively (D Jean Clandinin & Connelly, 2000), "narrative inquiry is a form of narrative experience…therefore, educational experience should be studied narratively" (Clandinin & Connelly, 2000, p.19). For this study, narrative inquiry was utilized as both the method and methodology to study the curricular experience as story. (Connelly & Clandinin, 2006). In this fluid, relational, and interpretive methodology, "researchers acknowledge that since context matters, human interaction and humans are embedded in context, and people, cultures, and events have histories that affect the present, findings from one setting cannot be effectively decontextualized" (Pinnegar & Daynes, 2007, p.11). Building off Schwab's view that context matters in curriculum, narrative provides

a way to capture the nuances of small incidents and encounters that would be of interest when examining human experience (Estola & Syrjälä, 2013) or curriculum as lived experience (Clandinin & Connelly, 1992). As evident in the conceptual framework guiding this study, lived experiences is a central tenet, so narrative inquiry would be the most effective methodology for capturing the participants' lived experiences. Narratives can be a powerful way of both representing and understanding experience, causing Clandinin and Connelly (2000) to imagine the exploration of experience through narrative inquiry as a metaphorical three-dimensional space with temporality along one dimension, the personal and social along the second dimension and place along the third dimension (Clandinin & Connelly, 2000, p.50). We always enter stories in the midst, somewhere along the dimensions of time, place, the personal and social, so we must acknowledge that the researcher, the participants, and the broad landscape of places are all in the midst of stories (Clandinin & Connelly, 2000). As we move in different directions within the inquiry (inward, outward, backward and forward), we make known through story by turning inward to the internal feelings, hopes and beliefs of the individual, by turning outward to the external relationships and environments and by moving forward and backward through the past, present and future of an experience (Clandinin & Connelly, 2000). As I engage in the inquiry, I engage in all four directions simultaneously, and as a researcher, I must ask questions that point to all directions.

Located within these shared narratives, we begin to see one's personal practical knowledge (Connelly & Clandinin, 1988, 1999). Connelly and Clandinin describe

knowledge to "[not be] something given to people, but [is] something narratively embodied in how a person stands in the work. Knowledge as attribute can be given; knowledge as narrative cannot. The latter needs to be experienced in context" (Connelly & Clandinin, 1988, p. 137). Seeing personal practical knowledge as narratives learned through experiences in context, narrative inquiry becomes a method for uncovering "the experiential knowledge that [is] embodied in us as persons and [is] enacted in our classroom practices and in our lives" (Clandinin, 1993, p.1). It is because of the relational aspects of narrative inquiry (Clandinin & Connelly, 2000) that the researcher can come in "close contact with details and with particularities that cannot be reduced to statistics or even to the measurable" (Greene, 1995, p.10) and it is embedded within those details as a participant's personal practical knowledge becomes known. In honoring Schwab's notion that "curriculum will deal badly with its real things if it treats them merely as replicas of their theoretic representations" (Schwab, 1969, p.611) and his call that a supplement (arts) is required for the theory to be used well, this study will use narrative methods to activate what he names the "arts of the practical" (p.611). In describing the three arts that would help bring theory to application, Schwab builds a path for utilizing narrative methods to capture the personal practical knowledge embedded within experience:

1. use arts (narratives) to identify the disparities between the real thing and theoretic representation
2. use arts (narrative) to understand how theory is modified in the course of its application in the light of discrepancies
3. use arts (narrative) as a way of taking into account the many aspects of the real thing which the theory does not take into account

The reliability and validity or trustworthiness of this study lie in the "understanding that knowing other people and their interactions is a relational process that ultimately involves caring for curiosity, interest, passion and change" (Pinnegar & Daynes, 2007, p. 29). The reliability and validity are not from producing the same result over and over again or a need for a generalizable or single truth claim, but rather a research text that gives a sense of what is 'true for now' (Bruner, 1987) or 'truthlikeness' (Bruner, 1986). This 'truthlikeness' can be developed through 'narrative resonances' (Conle, 1996) across data sources or through 'narrative exemplars' (Lyons & Laboskey, 2002), but it is ultimately the "readers who judge the extent to which our narrative accounts …[are] trustworthy. They decide whether [the] research study informs their knowing and contains semblances of truth that are actionable (Lyons & Laboskey, 2002) in their respective places and situations" (Craig, You, & Oh, 2017, p. 761). The shift of power and authority thoughtfully moves to the participants and the reader. By moving away from privileging the capital 'T' truth often found in purely quantitative research methods, narrative inquiry privileges the narrative truth (Spence, 1984) of the "lifelikeness" (Bruner, 1986, p.11) residing within the narrative exemplars (Lyons & Laboskey, 2002) that address the "credibility, transferability, dependability, and confirmability" (Gay, Mills, & Airasian, 2006, p. 403) of the study.

My aim in this inquiry is to uncover and explore my participants' lived experiences with design-based learning, their personal practical knowledge related to transversal skills, and move inward, outward, backward, and forward as they make known their best-loved self.

3. A BUTTERFLY'S LIVED EXPERIENCE: AN INTEGRATED WAY OF KNOWING, DOING, BEING, AND CURRICULUM MAKING YOUR BEST-LOVED SELF

At any given moment, your present is soon to become your past. The experience of the present transforms you into your future self and often there is an uncertainty in who you will be when you emerge, but through the emerging process, you have the choice to push towards flourishing through your 'best-loved self' story (Craig, 2013b) or stagnating in a 'frozen story' (Olson & Craig, 2009) that can temporarily or permanently prevent you from becoming your best-loved self. I invite you on this journey of sense-making through story and reflection as we explore the overarching design challenge of how one might come to know, do, and be and become their best-loved self.

3.1. Designing the Research Journey

A qualitative meta-analysis of Craig's articles (2012, 2013, 2014, 2015, 2017) on Helen (a P.E. teacher) through the lens of her work around best-loved self (2013) and the 'butterfly under a pin' metaphor (2012), this narrative inquiry utilized the serial interpretation tool (Schwab, 1954/1978) and the parallel stories tool (Craig, 1999) to explore a more holistic way of knowing, doing, and being as one designs to become a sustainable and flourishing version of their best-loved self. In keeping with the theme of design within this dissertation, a variation of the design-thinking process was employed (See Figure 3.1).

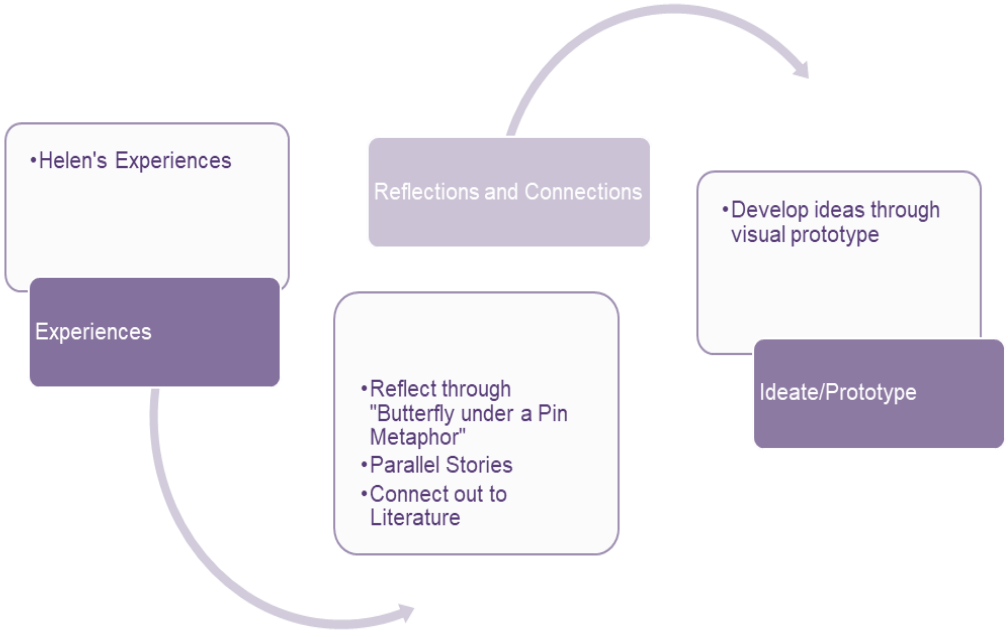

Figure 3.1 Design-based narrative inquiry process

Becoming your best-loved self could easily be argued to be an ill-defined problem (Cross, 2013) or wicked problem (Rittel & Webber, 1973), and it is through design that ill-defined or wicked problems should be tackled. Thomas and Carroll (1979)wrote:

> Design is a type of problem-solving in which the problem solver views the problem or acts as though there is some ill-definedness in the goals, initial conditions or allowable transformations. (p.19)

Jonassen (2000) described these wicked problems as problems that require "ambiguous speculation of goals, no determined solution path, and the need to integrate multiple knowledge domains" (p.80). If one imagines the becoming of your best-loved self as an ill-defined or wicked problem, then applying design processes would help

move toward solutions of "what might be" through an integrated way of knowing, doing, and being. Approaching this from the design lens keeps a focus on deeply understanding the user (Bicen & Gudigantala, 2019), which in this case, is the one becoming their best-loved self. Design requires a harmonious interplay between analysis, synthesis, and intuition and draws on what the well-known philosopher, C.S. Pierce, called abductive reasoning. According to Cross (2013), Pierce (quoted by March) suggested that 'deduction proves that something must be; induction shows that something actually is operative; abduction merely suggests that something may be' (p.19). Abductive logic requires empathy-driven research techniques to understand the problem which are often based on observations, stories, and reflections. From empathy, designers synthesize what they learned to gain insights and more clearly define the problem. After gaining insight into the problem, they use those insights to create ideas. Those ideas are used to develop prototypes, which often lead to more ideas and prototyping and often a refinement of the problem.

3.1.1. Empathy-Driven Research

Learning through stories is a means of sense-making, and within it lies the potential for creating meaningful connections across theory and practice and possibly lead to more sustainable learning (Connelly & Clandinin, 1990). McDrury and Alterio (2003) claimed that "formalized storytelling, like purposeful teaching, captures everyday moments and turns them into learning opportunities" (p.131). Transformative learning happens when our personal interpretation or sense-making of experiences focuses on knowing instead of knowledge (Mezirow, 1997). Focusing on knowing creates the

conditions for growth and empowerment (Mezirow, 1991, 2000). Bruner (1986) argued that "narrative knowing is not merely emotive expression but a legitimate form of reasoned knowing" (p.18). Bruner (2002) claims "lives narrow" if we put too much emphasis on the paradigmatic, whereas narratives have the potential to open the path to more fully knowing and growing.

3.1.1.1. Helen's Stories

Each of Craig's articles on Helen shed light on different lived experiences and the knowledge embedded within each experience that was shared during their researcher and participant journey. It is through these lived experiences that this serial interpretation enters by reconstructing the critical moments along her journey. Dewey saw education and experience as interwoven or deeply connected, allowing one to conceptualize 'lived experience' as curriculum (Clandinin & Connelly,1992), which is foundational to the belief that transformational learning starts first with experience (Taylor, 2007). With an awareness that experience is both personal and social and in all experience, the personal and social are always present (Clandinin & Connelly, 2000) or that experience can be seen as "individually continuous and socially interactive" (Pembrook & Craig, 2009, p. 797), we begin to see the complexity of the sense-making needed to effectively utilize experience as a path to transforming into and flourishing as your best-loved self.

3.1.2. Reflecting on Experience

Transformative learning also needs critical reflection and discourse with trusted others (Taylor, 2007), because Mezirow (2000) ascertains that learning does not come from the experience alone, but rather from the reflection on that experience. Shifting

from experience to reflection, I next enter Helen's journey by moving inward to my personal reflection or seemingly parallel stories to Helen's critical moments through the lens of a transformational metaphor: a butterfly under a pin. In Craig's (2012) article, *Butterfly Under a Pin: An Emergent Teacher Image amid Mandated Curriculum Reform*, the butterfly under a pin metaphor emerged and captured the "sense of freedom and grace…[of a] butterfly floating purposefully, yet unrestrictedly, in the air…[compared to the] defenseless butterfly frantically flapping its wings while its body is pierced by a sharp object that is simultaneously sucking the life out of it" (p.98). By reflecting through this metaphor, I was able to explore the contexts of her experiences and examine more closely the moments where she was free to enact her best-loved self compared to the moments where she felt pinned down and unable to enact her best-loved self.

Learning through experience or experiential learning as conceptualized by Kolb and Fry (1975) has been described as a learning spiral, because we are continually engaging in concrete experiences that can be "enriched by reflection, given meaning through thinking and transformed by action, [so that], the new experience created becomes richer, broader and deeper" (Passarelli & Kolb, 2012, p. 30). Passarelli and Kolb place learning at the boundary of tension or conflict between the internal self and the external environment (Passarelli & Kolb, 2012) The researchers go on to express that in those moments of tension or conflict, all functions of the human (thinking, feeling, acting, reflecting) are engaged in the process of learning and growing. These learning experiences have the potential to integrate growth or development across 'the affective,

perceptual, cognitive, and behavioral realms' (Passarelli & Kolb, 2012, p.16). By first reflecting through the metaphor and then allowing Helen's experience to enter the external environment through interacting her experience with my personal experience in parallel stories, I open myself up to a learning experience that can integrate growth and development across the 'affective, perceptual, cognitive and behavioral realms' as I explore how one might come to know, do, be and become their best-loved self.

3.1.2.1. Insights from Our Stories through Literature and Prototypes

After entering through experience and then reflecting through parallel stories and the butterfly under a pin metaphor, I connected my sense-making outward to the literature (theory) that could provide an additional lens to understanding Helen's and my own transformational journey towards knowing, doing, being and becoming her best-loved self. Connecting to literature offers an avenue for critically challenging our own perceptions through a new lens of understanding which in turn allows us to embrace our old lens and continue repeating our behaviors or reject our old lens with a more thoughtful or enlightened lens that would guide future decisions and actions (Mezirow 1998, 2000; Taylor, 2007). Creating artifacts or prototypes as you move towards a solution is a core component of design work. Artifacts are a 'meeting place' or 'interface' between an 'inner' environment and 'outer' environment, so the artifacts or prototypes would be purposeful on this research endeavor (Simon, 1996, pp. 7–9).

3.2. Meandering Through the Journey to Becoming Your Best-Loved Self

Each moment along this journey will enter first through Helen's experience, then reflect inward through the Butterfly Under a Pin metaphor and the author's story, and

thirdly will be connected back out to literature. After journeying through those three steps, a visual will be used to capture the ideas/prototype that emerged from triangulating my understanding across the three components. Upon completing our meandering through nine critical moments in Helen's life through this design-based process (see Figure 3.2), the final section of this article will combine the ideas and prototypes created throughout the journey into a final product 'for now' of what might be a way to know, do, be and design for becoming your best-loved self.

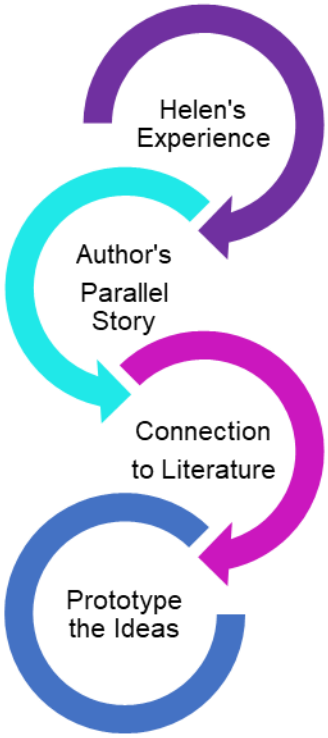

Figure 3.2 Roadmap for the research journey.

3.3. The Butterfly's Journey

3.3.1. Experience 1

> *Helen first became enamored with teaching Physical Education as a school subject in her fourth grade of school. It seems the specialist who taught Physical Education at her campus was ill and her teacher desperately needed someone to cover the class. Because Helen excelled at physical activities, her teacher chose her to plan and lead what would take place during PE period. From that point onward, Helen, in her words, was 'hooked'. Put differently, her interest in PE education was totally piqued. Since that time, the teaching of PE has been 'her passion'- 'her thing'.*

Helen got a glimpse of her best-loved future self in this moment. Doing something she excelled at while helping others learn sparked an emotional connection to teaching PE. This emotional connection, or "passion" as she described it, gave her a sense of freedom to be herself by doing something she loved. I got my first glimpse of being emotionally connected to teaching or teaching as my passion in first grade. Lucky to have an amazing teacher who knew me well, she partnered me with a student that was blind. Through that partnership, I fell in love with the potential of learning as a path to each person living as their best-loved self. Learning braille alongside Kamiar, I saw the need for different ways of learning, but I also caught a glimpse of how we both uniquely learned or grew from the same experiences. I can't speak for Kamiar outside of learning the technical skill of reading and writing with Braille, but for myself the importance of creating a place where every student belonged and every person could be uniquely themselves became embedded in my personal practical knowledge and enacted later in life as a teacher. My teacher knew that learning alongside him allowed me to be uniquely me and provided me a glimpse into a best-loved future version of myself. My

very next Christmas list was filled with overhead projector markers, grade books, and workbooks for my ‘students,’ which happened to be stuffed animals.

Creating the conditions where one can be well and do well is embedded within the literature on positive psychology and, more specifically, in well-being theory (Seligman, 2018b). As Helen and myself reflected back on those childhood experiences, we told the story in a way that expressed contentment and satisfaction of that past moment in our life, gave a glimpse into the hope and optimism that experience created for our potential future as teachers and it seems safe to say that in the enactment of those moments we experienced a feeling of joy (Seligman & Csikszentmihalyi, 2000). Within any positive experience, all three simultaneously existing (past, present, future) allows us to experience knowing, doing and being while illuminating the possibility of change or the becoming of a future version of our best-loved self.

3.3.1.1. Prototype 1

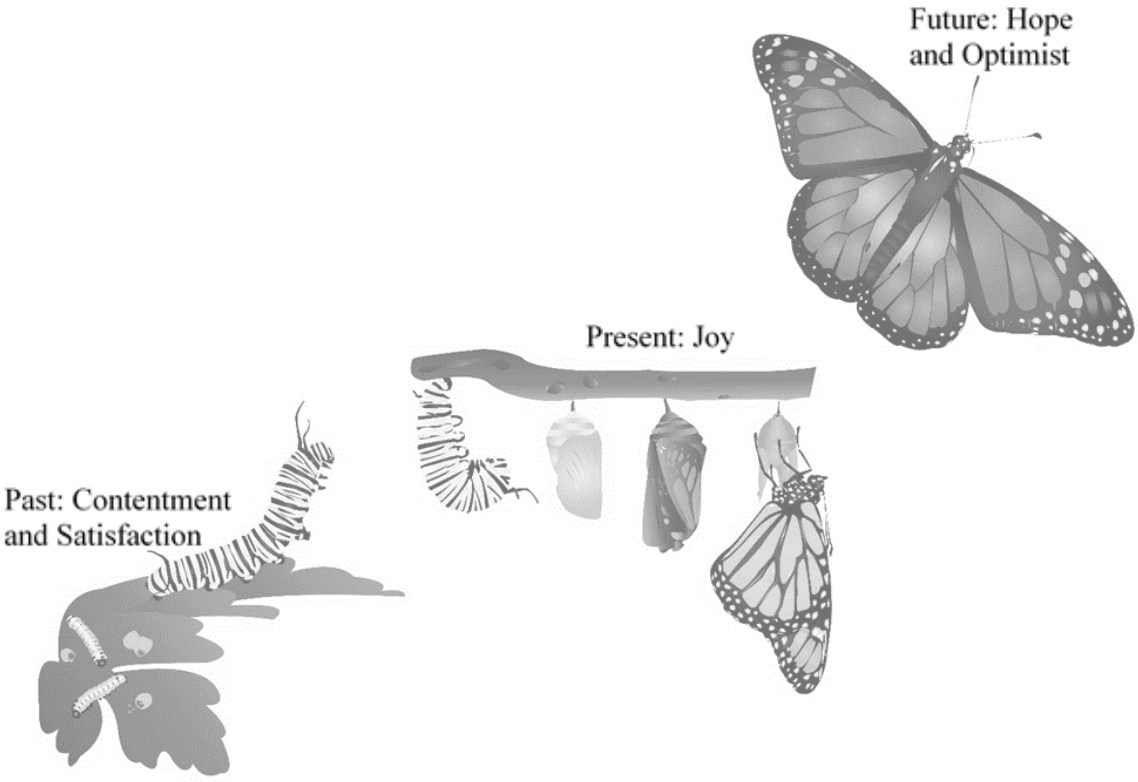

Figure 3.3 Past, Present, and Future of Well-Being

3.3.2. Experience 2

> *Helen attended a large land grant university in the northern US…she learned that Physical Education was a legitimate subject area meant for the health and well-being of all students…her philosophy of teaching PE developed…' a progressive view of PE education.'*

I imagine this as part of the process or the changing from a caterpillar to a butterfly. Learning that helps you attain the skills needed to be your best, but also learning that enables you to know what being at your best might look like in action if

you are aligned with your beliefs. My undergraduate experience was in many ways similar to Helen's experience with a progressive view of education; being embedded in a Jesuit education, I felt for maybe the first time that education was about more than learning a subject. History was more than learning the events of the past, but rather a critical discourse of all the conflicting players within the broader landscape of an intentional focus with a better vision of the future. It was an education that valued critical and creative thinking over knowledge, and it valued the collective good over the individual achievement. It encouraged us to incorporate these values in all the work we do by always striving for excellence or doing "more," valuing that we are part of something bigger, exploring to understand the broader global landscape we live so we know what for and with others might mean, embracing self-care, aligning our heart, mind, and soul so we more fully know who we are so we can do and be that person, and continually educating ourselves through experiences so we can increase our awareness and grow towards becoming our best-loved self. Learning to teach through the lens of these values along with the inquiry-based approaches we learned in our classes, my philosophy of teaching took shape: a philosophy grounded in a belief that we should be developing the whole person, creating transformational learning experiences, and gaining awareness that we are part of a bigger landscape that can be directly impacted by our decisions.

For transformational growth to happen, Mahmoudi et al. (2012) found that attention to all elements (physical, emotional, intellectual, social, aesthetic, and spirituality) is critical to the process of self-actualization. Bar-On (2010) found that a

focus on the individual (self-awareness) helps to create the capacity for change and self-actualization. Carl Rogers (1951) argued that the building blocks of self-actualization consisted of intangibles such as authenticity, unconditional acceptance, empathic understanding, and relational integrity.

Self-awareness, deeply connected with Dewey and Schon's ideas around experience and reflection, has become one of the central constructs of emotional intelligence (Bar-On, 2010; Goleman, 1995) and has been seen as foundational to not only success but happiness. Bar-On (2010) found that higher levels of emotional intelligence have a significant effect on human performance, happiness, well-being, and the quest for the meaning of life. Significantly broadening our society's limited view of education being mostly the growth of the mental domain and then adopting a more holistic view has the potential to change not only the well-being of individuals but the well-being of society as a whole.

3.3.2.1. Prototype 2

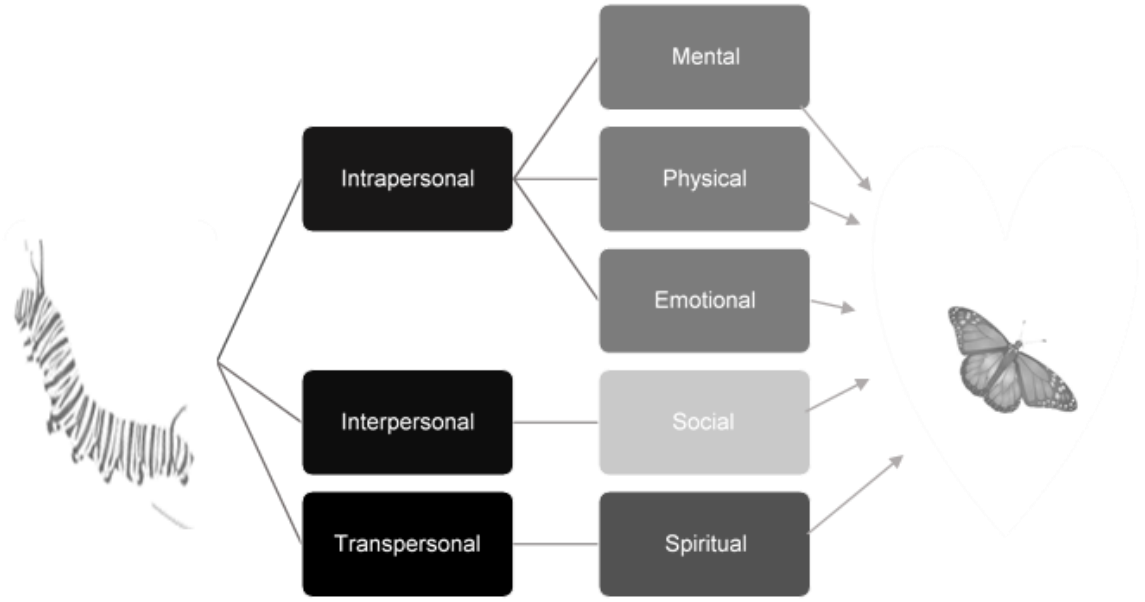

Figure 3.4 Holistic transformation into Best-Loved self.

3.3.3. Experience 3

> *[despite moving to a new geographical location dominated by the "sports" mentality of PE], Helen chose to teach as a 'lone wolf' PE teacher for the first five years in the field….[enabling] her progressive PE philosophy into action in a relatively unconstrained way…she became known for her 'out-of-the-box' approach to PE education.*

In this experience, Helen was free to enact her best-loved self by teaching in a way that aligned with her beliefs about PE education. So many times, you hear teachers say, "I shut the door and teach the way I want to teach instead of how I am told to teach." As a teacher, that freedom to teach (doing) in a way that aligned with what I know and believe as best, enabled me to journey on the path of becoming my best-loved

self. My very last year of teaching in an elementary classroom, I had almost complete freedom to design what I felt was best for my students. Despite being surrounded by many traditional direct instruction style teachers that ran classrooms with very little interaction among students, I embraced being at a technology-rich school with each student having a device, embraced my beliefs in STEAM education, and designed for hands-on, interdisciplinary experiences, as well as project-based learning experiences. I probably failed more than I had in previous years, but my students learned more, and my students' parents began to embrace a different vision of what education might be, and I fell more in love with teaching, learning, and design.

In Helen's experience with 'out-of-the-box' teaching, we see a glimpse of her engaging in activities that challenge her skills while developing her talents or what has been coined as flow (Csikszentmihalyi, 1990). Flow happens when you can deploy your highest strengths and talents to solve the challenges that you face. Csíkszentmihályi (1990) described flow not as passive or relaxing but as occurring "when a person's body or mind is stretched to its limits in a voluntary effort to accomplish something difficult and worthwhile" (p. 3). Flow doesn't happen because of mandates from outside forces, it happens through intrinsic motivation or the desire to do the task for its own sake, and it leads to a subjective sense of joy and confidence that keeps you pursuing more and more (Csikszentmihályi, 1990, 2008).

3.3.3.1. Prototype 3

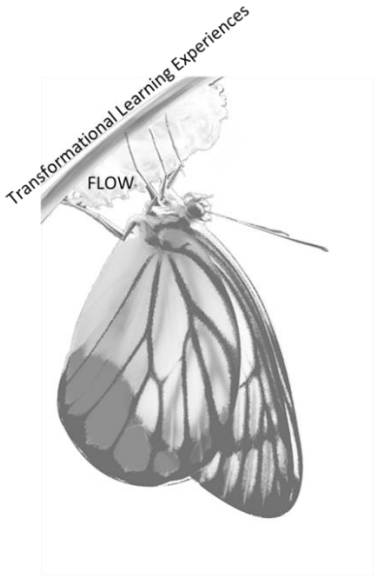

Figure 3.5 Butterfly in flow.

3.3.4. Experience 4

> *Later…Helen was hired…at this 'innovative and self-paced high school, [she] met for the first time in her career a fellow teacher, Randy, whose philosophy of Physical Education closely mirrored her own…created…"Hiding the Physical of Education'. Students engaged in personally chosen PE activities that developed the knowledge, skills and attitudes of the discipline and integrated material from other subject areas of well…students thought they were just playing around until a formal examination came along and they discovered they really knew something.*

Finding that teacher friend with similar beliefs about teaching is one of the best gifts you can be given along the journey. Not only was Helen or the "butterfly" free to enact her best-loved self, but she had found someone to share that experience with, someone she could collaborate with, someone she could experiment with, someone who added to her knowing, doing and being her best-loved self and someone who gave her

glimpses of becoming a future best-loved self. My last year in the classroom was probably the first time I met a fellow teacher friend who became a teaching partner that not only allowed me to enact my best-loved self but helped me redefine my future best-loved self. I looked forward to every conversation we had because it was filled with knowledge sharing and knowledge-creating, which encouraged me to explore gaps in my knowledge as I continually transformed into iterations of my best-loved self. One of my favorite shared moments (it was actually the next year when I was an administrator) was creating a Polar Express themed STEAM day where we completely transformed a hallway and the cafeteria into scenes from the book. Hence, students imagined through all their senses that they were on that magical journey. We formed a team that worked together from the moment the students left the building until 3:00 in the morning, went home to shower, and were back at 5:30 to finish up a vision that exceeded anyone individuals' idea that they brought to that first planning meeting. One of the absolute best moments of my career was watching the look on every child's eyes as they opened the door to that hallway and saw the transformation. The joy, the laughter, and their sense of wonderment resembled my feelings, and I knew in that moment I was exactly where I wanted to be. I had found a place to flourish.

Building off his authentic happiness theory, Seligman (2011) developed his own model, PERMA, or what he labeled Flourish because it is a combination of five indicators that would give rise to human flourishing. Seligman (2011) stated:

> I now think that the topic of positive psychology is well-being, that the gold standard for measuring well-being is flourishing, and that the goal of positive psychology is to increase flourishing (p.13).

Seligman (2011) moved past happiness, which he considered a thing and focused on well-being as a construct that has various measurable elements. The first element is [P]ositive emotion or feeling good. The second element is [E]ngagement or finding flow. The third element is positive [R]elationships or authentic connections. The fourth element is [M]eaning or purposeful existence. The fifth element is personal [A]ccomplishment or personal achievement or fulfillment. Utilizing this model as his framework, Seligman (2011) defines flourishing as finding fulfillment in our lives, accomplishing meaningful and worthwhile tasks, and connecting with others at a deeper level- in essence, while living the good life. In Helen's and my story, we see well-being isn't solely internal; there are always external relationships or interactions within the world that are working together to move an individual towards flourishing. Having close, mutually satisfying relationships, feeling like you belong, and feeling valued by others are vital components of connecting with others at a deeper or more authentic level (Ryan & Deci, 2001; Seligman, 2018b; Seligman & Peterson, 2006).

3.3.4.1. Prototype 4

Figure 3.6 Connecting with others on the journey to our best-loved self.

3.3.5. Experience 5

> *Unfortunately, Randy went to teach at a private school so his daughter could enroll in it tuition-free. As a result, a major paradigm and people shift occurred…the transition became very disheartening experience for her…was very hard to watch…it was especially rough because of [her] teaching style [compared to the fellow "sports-minded teachers]…the sharp contrast in approaches eventually became untenable.*

Shifting from a team with aligned beliefs, Helen felt an emotional pin as she was now on a team whose beliefs were misaligned with hers. Where she once felt free to live as her best-loved self, she now feels constrained as her beliefs and values conflicted up against those in her new milieu. When I made a move from the Northeast to Texas, I quickly realized how different the milieu was and how my beliefs and values in teaching were causing others frustration. I found myself in an open-concept elementary school, meaning no walls between classrooms and just a few sporadic bookcases and cabinets. Many teachers I shared the space with valued quiet, controlled classes even to the point that they had all students spend all day with a cardboard privacy tent up. Their beliefs contrasted up against my belief that students learn from engaging with each other in experiences. I annoyed many of those around me because of the constant chatter in the classroom. Chatter I see as learning, but they saw as disruption. I remember having a meeting with my principal, where she shared the complaints of the surrounding teachers. At first, I was embarrassed and ashamed, but I quickly allowed myself to embrace my beliefs and not feel ashamed of them. I shared that I believe kids learn through experiences, and experiences are social. I respectfully told her that I understood if she wanted to find a replacement for me, but I don't believe in teaching through worksheets, maintaining silence in the classroom, or tattling to the boss. While being assertive isn't

always my strength, it seems to be something I can rely on when someone tries to constrain me from doing what I see as best for my students. My principal came back to the table to compromise, and we were able to reach an agreement where I didn't feel like I had to be something other than the teacher identity I embraced at that point in time. Looking back, I do not think the compromise pinned me down entirely from being my best-loved self at the time, but it did almost create a halt on transforming or becoming a better version of my best-loved self.

In his 1969 paper, Schwab first used the word curriculum maker, and that image was later used to contrast the teacher as implementer of those predetermined objectives to teacher as curriculum maker where one feels empowered to create curricula based on the desiderata of the teacher, learner, subject matter and milieu (Clandinin & Connelly, 1995; Craig, 2002). "Curriculum making is a fundamentally practical and problem-solving enterprise in which teachers continually negotiate tensions arising from people having different interests, values, histories, and politics, each of which has a stake in the reflected curriculum" (Oh et al., 2013, pp. 244-245). Empowering teachers to negotiate those tensions between the teacher, learner, milieu, and content provide them the space for creativity in designing the curriculum. Schwab (1983) considers teachers to be 'the fountainhead of…curriculum decisions (p. 24), who 'must be involved in debate, deliberation and decision making about what and how to teach' (p. 245) and who, not only in the pre-planned curriculum but in 'moments of choice' constantly arising from the intersecting interactions of teacher, learner, subject matter and milieu within the school day. For Schwab (1954), "education cannot...separate...the intellectual from

feeling and action, whether in the interest of one or...the other" (p.108). Schwab (1983) cautioned:

> We may employ the emotional and active factors existent in students and teachers as a means for intensifying and facilitating the process of intellectual education- or ignore them and suffer at the least a loss of them as effective aids, and possibly an alienation which places them in active opposition to our purposes...Appetite, emotion [,] and reason...can[not] be abstracted from one another...in action. (pp.108-109)

Amidst his interconnected or more holistic view of education, Schwab made particular efforts to value self-agency and teacher agency: using words for self-agency such as "self-moving living thing," able to "produce itself," "develop itself" and to create a 'personal history' (Schwab, 1964, p. 8) and describes teacher-agency through statements such as "fountainhead of curricular decisions," [students] "are better known by no one [else] but the teacher," and claiming those teacher deliberations are a "pooling of diversities of experience and insight" (Schwab, 1969, p. 30; Schwab, 1983, p. 254). In continuing Schwab's line of thought, limiting a teacher's freedom to design or taking away their self-agency would result in limiting their ability to develop themselves, which in turn would freeze them from moving forward to their "best-loved self" story. In both Helen and my narratives, we felt a pin that prevented us from being designers of our learning environments, but also in many ways, there was a pin in designing our best-loved self-story. If a designer embraces "human centeredness, empathy, mindfulness of process, a culture of prototyping, a show don't tell approach, bias towards action and radical collaboration" (McKenney et al., 2015b, p. 186), then limiting a teacher or a

student from being a designer strips them of their self-agency and the ability to produce the transformational learning experiences needed for our students to flourish.

3.3.5.1. Prototype 5

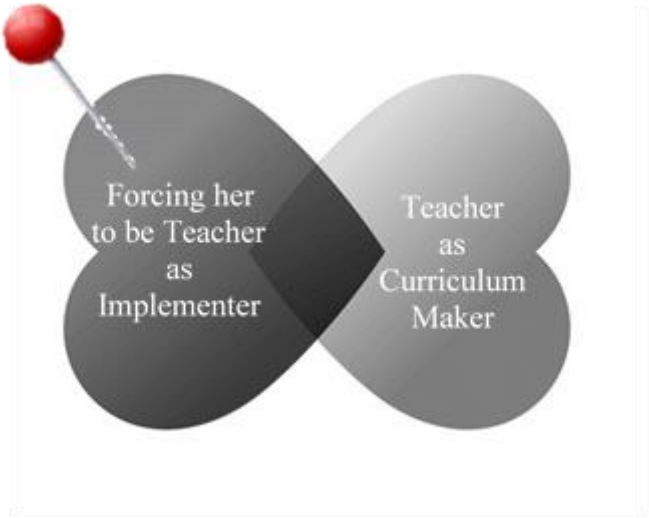

Figure 3.7 Constraints from living best-loved self as curriculum maker.

3.3.6. Experience 6

> *She was…'heart-broken over the 'death' of Randy and her programme…her PE mentors at the northern university where she had been prepared…reminded her of the toll her negative experience was having on her passion for PE teaching and how her passion was being sapped…Helen did not want to be robbed of her passion for PE teaching in this way…so, after 14 years of employment…she resigned.*

Pins are all over this butterfly, robbing her of the joy of enacting as one's best-loved self. Sometimes you need that critical friend (s) to point out the moments where you might not be at your best. Caught in a personal situation that was robbing me of joy, as well as a barrier to pursuing my passion, my daughter (8 yrs. old) frankly stated, "it's your choice to make the hard decisions so that we can be happy today and not someday in the future." While not all constraints entirely pin you down from living the good life,

some pins don't even let you flap your wings. Basically, my daughter was saying, if something is pinning you down, it's your choice or within your power to release that pin through a decision. Often, we don't feel that empowerment to make the decisions and instead choose to stay a 'butterfly under a pin' or remain stuck in our 'frozen story', allowing our well-being to fade away slowly.

Helen's story thus far aligns with the research on harmonious passion, teaching was a part of her identity, it was a self-defining activity that she loved, found meaningful, and one in which she invested a lot of time and energy. Studies have shown that harmonious passion has a positive impact on flow, deliberate practice and performance, secure sense of self- esteem, higher life satisfaction, vitality, and well-being (Hodgins & Knee, 2002; Vallerand et al., 2010). Harmonious passion "would be a teacher who loves and highly values teaching and volitionally engages in the work," and the teacher would "derive pleasure and self-actualization from teaching" (Fernet et al., 2014, p. 273). Studies have looked at the role of passion and teacher burnout (Carbonneau et al., 2008; Fernet et al., 2014), and others looked at how burnout could be affected by job autonomy (Fernet et al., 2014). As Helen's professors alluded to and my daughter stated, 'it's your choice to make the hard decisions so that we can be happy today and not someday in the future.' Helen was faced with a hard decision, but she refused to be robbed of her passion and, ultimately, her well-being. Maybe instead of looking at why teachers leave in terms of all the negative aspects of the job, perhaps it is time we give value to the fact that the policies in place, or the contexts in which teachers have to work force a pin in them living their identity (best-loved self) because teaching

is a harmonious passion that they wish to share fully with the world. It makes me wonder if a harmonious passion can shift or feel more like an obsessive passion when external pins are being forced in a way that you can't embrace that harmonious passion in the external context.

3.3.6.1. Prototype 6

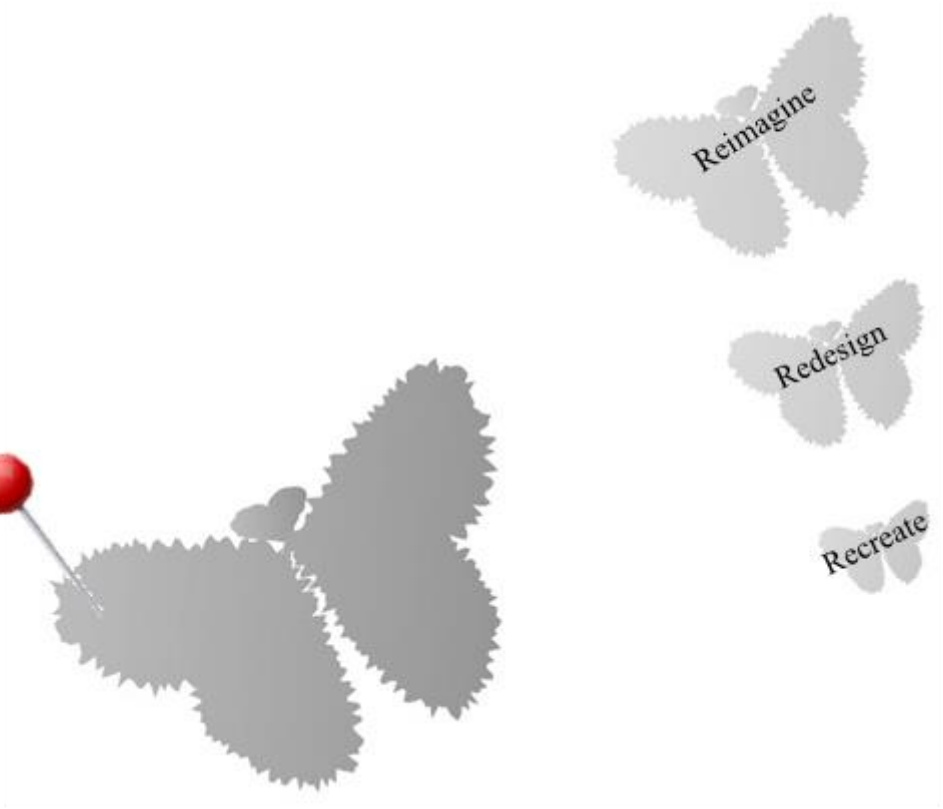

Figure 3.8 Constraints that force the search for a new version of your best-loved self.

3.3.7. Experience 7

> *She decided to substitute the pursuit of one 'passion'- teaching Physical Education- for the pursuit of another 'passion'- her interest in fish…she was about to launch a private business dealing with the care of exotic species…when Helen's targeted market 'tanked' [post 9/11]…she opted for the next best thing*

that would fulfill her second dream: employment in the fish department of a pet store chain.

It seems that teachers don't just have one passion (embedded within their love of teaching is often other passions), so when they get constrained from living as their best-loved self, they seem to begin exploring other possibilities. Most teachers go into the profession because they care, but often they find different paths to caring because that first dream can't be fully realized within the constraints of the current education system. Unexpected detours or barriers as we transition from one dream to another are often seen as doors closing, but often they give us glimpses into more clearly defining our purpose and our future best-loved self. In my transition from teacher to researcher, I had the side opportunity to join a research team looking at utilizing technology for enhancing writing instruction with 2nd graders. The opportunity had some components that aligned with the excitement and joy that come from a love of discovering ways to enhance learning, but it turned out to be more of a job enacting technology-enhanced learning in a way that contradicted my beliefs. A belief that writing is creative and technology can help them visualize compared to a belief that technology's value lies in the spell check and voice to text dictation. Sometimes it feels like there is a pin in each section of your wing, and sometimes it feels like the pin is just in one part, but the impact is just the same: a partial alignment. This experience was a partial alignment with my dream of researching, but it was still off from completely living as my best-loved self. That search for alignment involves a lot of deep reflection and understanding of one's self.

In previous literature, many philosophers have suggested that passion leads to purpose and meaning in their lives (Hume, Rousseau, Hegel). Understanding what meaning in your life looks like requires reflection, but not just reflection on behavior, a more integrated reflection that goes to your core. Kolb and Fry (1975) focused on using reflection to understand practice, but Korthagen and other researchers (Connelly et al., 1984) found the focus on the abstract concepts left the concrete and more individualized understandings of one's actions out of the reflective process (Korthagen & Vasalos, 2009). Day (1999) claimed that Kolb's experiential learning model "fails to take account of the need for developmental links between cognitive, emotional, social and personal development in the journey towards expertise" (p.69). Within one's professional and personal practice, the behavior that is exhibited is a result of more than just their thoughts; it is also guided by their emotions and personal needs or what could be considered their 'whole being' (Korthagen & Vasalos, 2009, p. 3). Korthagen and Vasalos (2009) go on to discuss that it is not just the individuals 'whole being' that is in an experience, but the others with their own personal frame to their 'whole being' creating complex situations or contexts for a practitioner.

3.3.7.1. Prototype 7

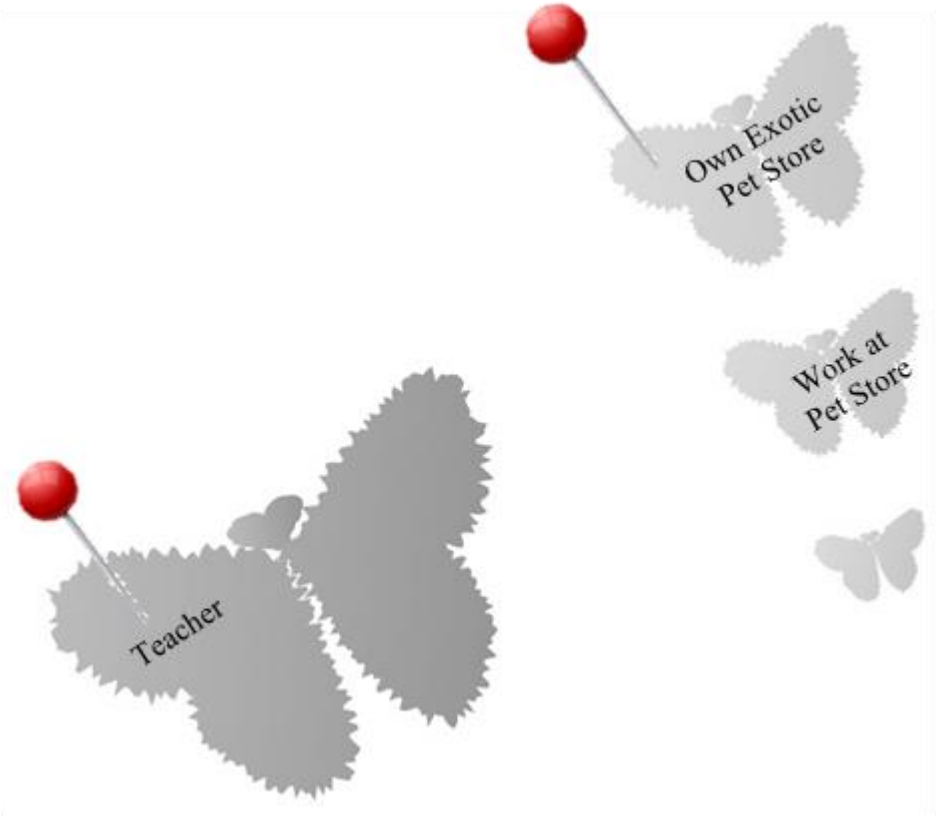

Figure 3.9 Internal and external constraints that prevent you from living your dreams

3.3.8. Experience 8

> *A former student came into the Pet Store and questioned why I, a teacher, was selling exotic fish. I reminded [my former student] (who was now attending a Tier 1 university) that he already knew why I was leaving the profession. The student who had be one of the worst in {her] career expressed deep regret about [her] decision. Without [her], he confessed, he might not have made it to university…He told [her]: 'I think of you every day because something happened to me when you taught me'. He went on to say: 'Will you do me a favor and go back to teaching?*

Leaving Munich at the age of 15, Einstein attempted to enroll at the Polytechnic Institute in Zurich, only to find out he failed the entrance exam, forcing him to attend a

Swiss school for remedial coursework. This event becomes almost a peripeteia- “a sudden reversal of circumstances that swiftly turns a routine sequence of events into a story” (Bruner, 2002, p. 5), creating a detour from what seemed to be his imposed path to a new story worth telling (Olson & Craig, 2009). Einstein’s new school was humanistic in nature, and they believed in the freedom to search for knowledge. Just like Einstein’s event of failing a test and being forced a different route, Helen’s encounter with this student was her peripeteia. In her imposed path of working in a fish store, this event unstuck Helen from what seemed like a ‘frozen story’ and awoke her to detouring to living her ‘best-loved self’ story. I have had many of these moments across my life, but I will share the one that awoke me to detouring back to my best-loved self as a researcher.

Previously, I shared about the research project on using technology to support writing development in second graders and how it misaligned with my beliefs, but there was one encounter with a little boy that unstuck me from my ‘frozen story.’ There was a little boy, Urban, who fell in love with writing, but the only thing reported on him was pre/post-test scores that remained relatively the same. The numerical research story imposed on him as showing no statistical difference or almost a ‘frozen story,’ but I saw his story very differently. One of my first conversations with him, I asked him to tell me about something fun he had done over the weekend. Similar to his pre-test writing sample, it was one sentence: I played soccer. I continued to explore and ask him questions. The following week, I took him a Toontastic video I created based on our conversation. I included all the details I learned from my exploring, and he got a big

smile on his face and began telling me all he noticed in the video. I challenged him to create a new digital story with a different plotline. He played around with it during the limited time the intervention allowed, and we celebrated his progress in mastering the technology and in adding details to his story.

That next week, he excitedly came running up to me to share that he had downloaded Toontastic at home and had been creating stories every night. I will never forget what he said to me, "I never knew I had such great stories in my head." In my reflection of this event, I thought back to the beginning of my higher education as a math major, I loved numbers, and that continued as I became a teacher, but it was never the numbers that drove my decisions, it was ultimately the stories and connections that led me down my paths. At times numbers seemed to bind me to a decision, …but those decisions quickly became unbounded by the past, present, and future of the story that gave meaning or made sense of that number. Throughout my teaching career, it was my unbounded explorations of those stories that allowed me to create new meaning and design an image of a teacher that resonated with me, so how did I need to detour to live out my 'new story worth living' and allow myself to continue on my path to becoming my 'best-loved self' as a researcher that integrated into my identity so I could feel well, do well, and be well.

As one's desires collide within a landscape of both themselves and others to create the moments of anagnorisis or a "radical kind of knowing that reverses and clarifies everything a character had believed before, yet perhaps also knew without knowing it" (Trousdell, 2016, p. 49). Trousdell goes on to say that these moments are

more than just a spiritual epiphany; they are "emotionally jolting, world-changing experience that…transforms suffering into understanding…an experience dependent on both emotional memory and spiritual forces beyond human will" (p. 49). Consider how being emptied through experience can bring you to life by allowing you to reshape your future. When we are in periods of misalignment or disintegration and those jolting moments happen, they have the potential to bring us to a different place of knowing, which in turn gives us the power to design a reintegration that brings us a little closer to our best-loved self. Designing for the reintegration involves the training of the mind, the cultivation of the heart, and the commitment to our relationships and the outer world (Santorelli, 2011, p. 208).

3.3.8.1. Prototype 8

Figure 3.10 Designing the reintegration of the best-loved self.

3.3.9. Experience 9

> *In reflecting on the Pet Store incident, Helen said, well, he[God} had to get my attention somehow…I am now in a very good place…it [PE teaching] is my gift…I have already built a PE program, so I have met that goal…I don't care if I*

> *ever build another program. I don't even care if I am never named Teacher of the Year. These things do not motivate me…I just want to keep on learning. I want to be able to create things with my students, you know…I just want to keep on growing…*

The threat of those past pins might still be there in the background, but Helen has reframed those threats, so they don't inhibit her from living her harmonious passion of teaching. The love of learning, growing, and creating is what she loved about teaching, and that incident in the pet store helped her to realize that. That event in the pet store opened the door to learning or what Aristotle called, anagnorisis, that allowed her to imagine a reframe of her past experiences in a way that brought about thoughts of contentment and satisfaction, to realign her inner core so she can engage in moments of flow and joy and bring her feelings of hope and optimism to design her reintegration into the relationships of her outer world in a way that aligns with her knowing, doing, being and becoming her best-loved self. It is only because she was open to learning from that experience that she was able to unstick her frozen story and meander back to the path of flourishing.

So often we think joy comes when there are no pins, but maybe joy comes when we cross the boundary between using our inner strengths and passions and serving the greater good of those we love and those in the world through sacrifice…but maybe that sacrifice looks different from what we initially think it looks like because at first glimpse we are evaluating through the materialistic world, but when given these attention-getting moments we evaluate them through a more divine or spiritual way of knowing. I recently went through a period of significant change. During that time I can pinpoint the moment

that freed me from sacrificing through the lens of this world, to understanding sacrifice from a broader, more spiritual way of knowing. As a mom, we want to always do what is best for our children, and I was no different. I thought by sacrificing my wants, needs, safety, etc. to create some prototype of what society says is the perfect life was what was best for my children, and I allowed every pin to be placed in my butterfly, so I could try to create a butterfly with no pins for my kids. I slowly realized that this sacrifice was not working and different pins were popping up into my kids' butterflies, but I still felt like I was doing what was best for them until one of them sat me down and engaged me in what would become an emotionally jolting and world-changing moment of learning. Basically, my child told me I held the control to allow them to be free and live a happy life through the decisions I was making or to keep them stuck in a frozen story until they moved out of the house. One of them said, “what was meant to be in the past, doesn’t mean it is meant to be forever.” In that one moment, I had a new way of knowing that allowed me to reframe my past experiences with contentment, see the future with hope and optimism for not only myself but the ones I love most and experience the ability to find joy in the present as I made some of the most challenging and painful decisions needed to detour us all back to living our best-loved self story. I ended up sacrificing the one thing I was trying to keep intact because this new way of knowing called for a different way of doing and being, which ultimately opened me up to transforming into a better version of myself.

This new path is filled with the hope of a future version of my best-loved self that can flourish because I’m living in a more harmonious tension between my inner and

outer world despite the sacrifices and pins that come my way. At times freedom comes from physically removing the pins, but also there is a freedom that comes from reframing the pins through mindfulness, self-compassion and by living a commitment to embracing the learning that comes from letting other ways of knowing into your being so that you can surrender from your pre-imagined version of your best-loved self story and more fully be present in the best-loved self story you are living. This presence allows you to keep continually growing and transforming into your future best-loved self.

While Bar-On (2010) found that higher levels of social-emotional intelligence positively impact well-being and the quest for meaning in life, spiritual intelligence moves us deeper into that quest for the meaning of life, by exploring what a mission in life might be, developing an intuitive understanding of the material, and believing in a better world (Amram, 2007). Coined by Zohar (1997) in her book, *Rewiring the Corporate Brain: Using the New Science to Rethink How We Structure and Lead Organizations*, spiritual intelligence taps into both our inner self and our deep connection to the well-being of all. Wigglesworth (2006) defines spiritual intelligence as "the ability to behave with wisdom and compassion while maintaining inner and outer peace regardless of circumstances" (p.5). When we access these higher meanings, values, abiding purposes, and begin embedding them in our day to day living, we lead happier and more creative lives (Zohar, 2005).

Reflecting through all components of being human (mind, body, heart, spirit) or our 'organs of perception' (Bar-on, 2010, p.2) allows us to counter the silo ways our

world has created for knowing. Allowing the idea, experience, feelings, and meaning to live in the transformational learning experiences and then reflecting through an integrated way of knowing, we are opening ourselves to living in a synergy between our inner and outer world. This integrated way of knowing allows us a synergistic way of doing, being and becoming our best-loved self as we enter or re-enter the external world.

3.3.9.1. Prototype 9

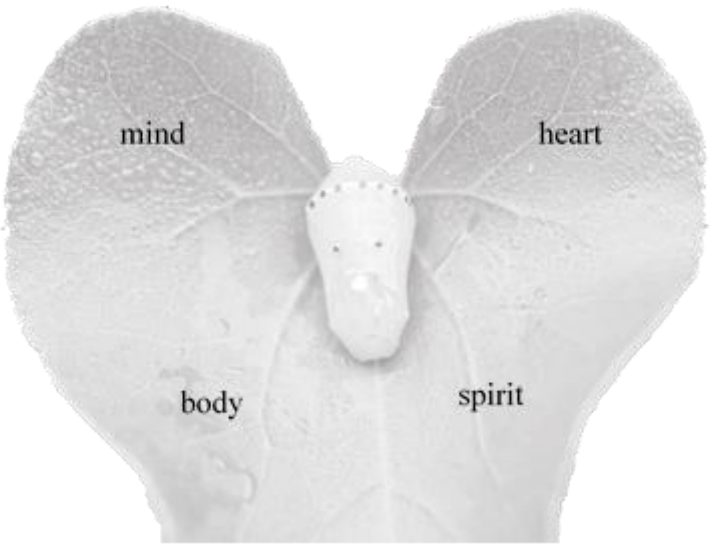

Figure 3.11 Knowing through the 'organs of perceptions' as you reintegrate.

3.4. Final Reflection on Curriculum Making Your Best-Loved Self

A look to the past at Schwab's (1954/1978) use of best-loved self and how it bubbled up in Craig's research (2013):

> He [Joseph Schwab] wants something more for his students than the capacity to give back to him a report of what he himself has said. He [Joseph Schwab] wants them to possess a knowledge or a skill in the same way that he possesses it, as a part of his best-loved self...He [Joseph Schwab] wants to communicate some of the fire he feels, some of the Eros he possesses, for a valued object. His

> controlled and conscious purpose is to liberate, not captivate the student. (p.124-135)

In living as your best-loved self, Schwab connects it beyond a "state of mind" to a state of knowing through the feelings of "fire" and "eros" for a valued object, a state of doing through "liberated" actions for a valued object, and a state of being through living their purpose through the possession and enactment of "knowledge or skill." As Craig (2013) explored Schwab's notion of best-loved self, she stumbled upon an unpublished manuscript (*Community: A Mission for the Schools*) in the Schwab Archive at the University of Chicago. In describing what she read, Craig (2013) stated that Schwab "emphasized the importance of having 'more satisfying lives (p.i.)" (p.270). Craig (2013) went on to describe how, when she "read that preface, [she] could not help but think that best-loved selves figured importantly into Schwab's vision of more satisfying lives" (p.270). In the closing comments of her article, *Teacher Education and the Best-Loved Self*, Craig (2013) referenced the Delors Report (1996) in which the United Nations Educational, Scientific, and Cultural Organization (UNESCO) universally agreed upon the four pillars of education: learning to know, learning to do, learning to live together, and learning to be (Delors et al., 1996, p.8). Craig went on to claim that she "think[s] Joseph Schwab's notion of the best-loved self attended in a very large way to being and living together" (2013, p. 270).

It is at that space where one learns to know well, do well, feel well and be well and enter into a synergistic space where they can live well among others that we get a glimpse of what flourishing as your best-loved self might entail. The sustainability of self-calls us to a place of well-being that is synergistic with learning through holistic and

creative ways of knowing, doing, and being We know that humans strive to lead meaningful, happy and good lives (Seligman & Csikszentmihalyi, 2000), so imagine if the curriculum making within a classroom allowed the learners and the teachers to know through their mind, body, heart, and spirit (organs of perception), and then to imagine, design, and create the path to becoming their best-loved self. This might just create the space for learners to lead the meaningful, happy, and good lives they desire within their personal, relational, and worldly milieus. Paul Rand, a graphic designer, said, "to design is much more than simply to assemble, to order, or even to edit; it is to add value and meaning, to illuminate, to simplify, to clarify, to modify, to dignify, to dramatize, to persuade, and perhaps even to amuse. To design is to transform prose into poetry."

In a later writing by Craig (2017), she stated that "the last time Helen was visited; she was productively team teaching with a beginning teacher who shared the same growth mindset and zest for teaching as she did" (p.202). As depicted in Figure 1, Helen was no longer 'a butterfly under a pin' because she embraced the integrated way of knowing through mind, body, heart, and spirit and courageously made decisions to engage in the curriculum-making of her future story as she flourished through living her best-loved self story as a P.E. teacher.

3.4.1. Final Prototype

Figure 3.12 Intersected ways of knowing, curriculum-making, and being our best-loved self.

4. FLIPPED EQ: A NARRATIVE INQUIRY INTO UTILIZING DESIGN-BASED LEARNING EXPERIENCES TO DEVELOP TRANSVERSAL SKILLS

4.1. Coming to the Inquiry

Tasked with educating students who were en route to adaptive behavior classrooms, I became wrapped up in finding ways to help my elementary students come to know and effectively navigate their emotions and behaviors while encouraging them in their journey to becoming their "best-loved self." Engineering design activities became a semi-controlled learning experience for me to build the vocabulary and awareness around their emotions and behavior and then begin to give them the tools to use in other situations where they were 'triggered.' This quest and the resulting success I had in the classroom led me to this research topic aimed at better understanding the connection between learning social and emotional skills and design-based learning experiences.

4.2. Introduction

With innovation driving the economy, engineers are often encouraged to make the connection between scientific knowledge and societal problems, needs, and wants. In 1991, the Green Report, *Engineering Education for a Changing World*, encouraged institutions to make changes to their education programs to meet the needs of the changing industry better. Included in that call was a focus on team skills, communication skills, leadership skills, and making decisions with an awareness of the societal, economic, and environmental impact. Over time, it has become evident that

Engineering is based upon a relationship with society, engineering teams are in a relationship with each other, and the engineer is in a relationship with oneself. Understanding and managing yourself provides the foundational self-awareness needed to be a collaborator on teams, understanding others is critical to your ability to interact collaboratively on teams, and an awareness of the bigger picture of the greater societal problems, needs and wants gives direction to those collaborative efforts.

Within the educational context, learners should leave their PK-12 or PK-16 experience with the skills needed to navigate not only the workplace but also life successfully. In education, we are tasked with developing students for their post-graduation life, but in a way that supports addressing the greater societal problems, needs and wants. In 2018, the National Association of Colleges and Employers (NACE) listed the most desirable skills of new graduates: problem-solving, ability to work in a team, communication skills, and leadership. Part of the response to address the current needs of society has been the shift to focus not only on academic skills but also on the social and emotional skills. The leading organization for social-emotional learning, the Collaborative for Academic, Social, and Emotional Learning (CASEL), within the field of education, was formed in 1994 to advance the practice of social-emotional learning. They developed a framework for five competencies that should be taught across various contexts (classrooms, homes, and communities): self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Social and emotional learning has been shown to positively impact academic achievement,

individual well-being and pro-social behaviors and attitudes (Depaoli et al., 2017; Durlak et al., 2011; OECD, 2018; Rivers et al., 2013).

This research study is situated at the intersection of engineering and education. Just as there has been a call for developing an engineer's team, communication, leadership, and decision-making skills so they can more effectively meet society's needs through their engineering work, education is making a call for the same development of skills so students can experience well-being and more effectively meet society's need to create a healthy and sustainable future. This study seeks to explore the overarching design challenge of how might we flip the need for developing these skills in engineers (Schulz, 2008) to explore using engineering design experiences to develop these skills in students (Crumpton-Young et al., 2010; Rover et al., 2003).

4.3. Contextualizing the Study

To explore the possibilities of intersecting engineering with a more holistic view of education, this research study more narrowly focused on transversal skills and design-based learning; two concepts that, by definition, involve the capability of crossing boundaries. This will allow us to explore the possibility of crossing boundaries between engineers needing transversal skills and using engineering design to develop transversal skills.

4.3.1. Transversal Skills

With most learning focused on domain-specific skills or content area knowledge, it is often the skills that transcend disciplines or cross boundaries that allow one to excel within the demands of both their personal and professional life. Transversal skills are

"skills that are typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings" (UNESCO-International Bureau of Education, 2013). These transversal skills can be referred to as soft skills, non-technical skills, social and emotional skills, leadership skills, emotional intelligence, etc. in both research-based and practitioner-based articles. Although each of those terms has slightly different bounds, they allude to the essence of the definition of transversal skills used to frame this study.

4.3.1.1. Emotional Intelligence

The numerical view of transversal skills for this study will be through the lens of emotional-social intelligence. Emotional-social intelligence, a term preferred by Bar-On (2010), begins with self-awareness and understanding oneself to make sense of our inner experiences (Abe, 2011), as well as a focus into the individual to help create the conditions and capacity for change and self-actualization (Bar-On, 2010). Baron (1997, 2004, 2006) uses the term emotional-social intelligence (ESI) because he finds it to be intrapersonal and interpersonal components, leaving him to define it as an array of non-cognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures. Bar-On's model (see Table 4.1) measures one's overall EI score, five composite scores, 15 subscales, and in some reports, a well-being indicator score that is considered to both contribute to and be a product of emotional-social intelligence.

Table 4-1 15 Subscales of the EQ-i 2.0

Subscales	Definition
Self-Perception Composite	
Self-regard	Respecting oneself, confidence
Self-Actualization	Pursuit of meaning self-improvement
Emotional Self Awareness	Understanding own emotions
Self-Expression Composite	
Emotional Expression	Constructive expression of emotions
Assertiveness	Communicating feelings, beliefs; non-offensive
Independence	Self-directed, free emotional dependence
Interpersonal Composite	
Interpersonal Relationships	Mutually satisfying relationships
Empathy	Understanding; appreciating how others feel
Social Responsibility	Social consciousness; helpful
Decision Making Composite	
Problem Solving	Find solutions when emotions are involved
Reality Testing	Objective; see things are they really are
Impulse Control	Resist or delay impulse to act
Stress Management Composite	
Flexibility	Adapting emotions, thoughts and behaviors
Stress Tolerance	Coping with stressful situations
Optimism	Positive attitude and outlook on life
Well Being Composite	
Happiness	Satisfied with life content

While considered to be "broad-based and good," critics of mixed models, specifically Bar-On's model is that it is "not purely measuring emotional intelligence, as it is focused more on adaptive functioning such as social skills, coping with stress, [and] motivation" (Kanesan & Fauzan, 2019, p. 5) For the purpose of this study, the need to measure the construct of emotional intelligence solely is not needed, because we are using the term transversal skills, which is not strictly bounded to measuring only the construct of emotional intelligence. Hence, the broader focus of the assessment aligns well with this study.

4.3.2. Transversal Skills and Engineers

In 2015, the American Association of Engineering Societies (AAES) and the U.S. Department of Labor (USDOL) worked together to develop an Engineering Competency Model that outlines the core competencies of engineering professionals. While the model includes domain-specific competencies, it also captures many transversal skills (see Figure 4.1). Across tiers one through three, we see various transversal skills: interpersonal skills, adaptability, and flexibility, communication, teamwork, creative thinking, etc.

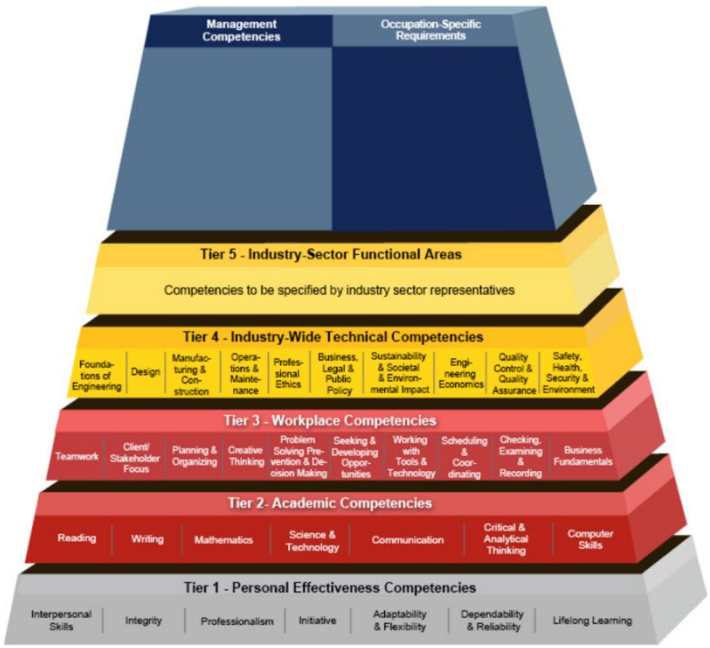

Figure 4.1 Transversal skills embedded in the engineering competency model.

As the landscape of engineering continues to change and include more team-based work, the industry is demanding more socially, culturally and contextually aware engineers who can navigate the flow between individual and team-based work in a way that leads to a globally sustainable future. The milieu of engineering is deeply interpersonal (Joyner et al., 2012), and it is no longer intelligence or technical skills alone that are needed to be successful within the field (Lappalainen, 2015). Research has shown that developing transversal skills in engineering students affects their academic performance and then continues to impact their professional success (Casado et al., 2016). When looking at leaders within the professional landscape, research has shown transversal skills to be essential to the relationships among members and effective team interaction and the overall team productivity (L. M. Prati et al., 2003), so it is becoming more and more imperative that they are addressed within the educational landscape. As a response to industry needs, engineering education is looking at ways to embed the transversal skills into the technical courses in an effective and efficient method (Schulz, 2008). This situation creates an opportunity for developing pedagogical approaches to embed the learning of transversal skills within core courses, understanding how better to support both teachers and students with that integration, and continue to learn more about how we best learn transversal skills.

4.3.3. Transversal Skills and Education

Much attention has been given to social-emotional learning (SEL) or the development of transversal skills in recent years within the educational landscape. In a study that compared K-12 schools with programs focused on developing social-

emotional skills to those without, they found those with the program improved student skills 57% more than those without a SEL program, 27% more improved academic performance, and 24% more improved their emotional well-being and social behavior (Mahoney et al., 2018). While 97% of those leading schools believe teaching these skills will improve student behavior, learning, and development, only 37% have a plan on how to teach those transversal skills (Atwell & Bridgeland, 2019)As a response to the desire and need for developing these skills during a student's educational career, more research and development has been filtered to developing evidence-based programs for schools to implement.

4.3.4. Transversal Skills and Design-Based Learning

Design-based learning (DBL) experiences can be defined as problem-based team learning experiences where learners utilize the processes of inquiry and reasoning and build knowledge-in-action through interactions and iterations as they move towards designing innovative artifacts, systems, and solutions (Smith, 2018 Gómez Puente, Van Eijck, & Jochems, 2012 Fortus et al. 2004). DBL is believed to provide the opportunity for learners to engage in design, build understanding across disciplines, and apply the knowledge across disciplines in meaningful ways (Cross, 2006a; Fortus, Krajcik, Dershimer, Marx, & Mamlok-Naaman, 2005; Wagner, Baum, & Newbill, 2014; Wells, 2013). In looking across literature, Table 1 is a synthesis of the characteristics of design-based learning experiences.

Table 4-2 Characteristics of Design-Based Learning (DBL)

Characteristics	Sources
Utilize prior knowledge	Goel & Pirollie, 1992; Perez et al. 1995; Doppelt, Mehalik, Schunn, Silk, & Krysinski, 2008
Experiments with solutions, explores possibilities, ideation, imagination	Rowland, 1993; Cross, Christianns & Dorst, 1994; Casakin & Goldschmidt, 1999; Dorst & Cross, 2001; Roberts 2001; Dym et al., 2005; Cross, 2006; Atman et al. 2007; Doppelt et al. 2008; Cross 2008; Lawson & Dorst, 2009
Creating knowledge-in-action	Goel & Pirollie, 1992; Dorst & Cross, 2001; Smith, 2018
Real-life, authentic	Hirsch et al., 2001; Massey, Ramesh, & Khatri, 2006; Van Til et al., 2009; Gómez Puente, van Eijck, and Jochems, 2011, 2013
Team-based/Collaborative	Kolodner, 2002; Denayer et al., 2003; Doppelt et al., 2008; Chang, Yeh, Liao, & Chang, 2008; Ke, 2014; Gomez Puente, van Eijck, & Jochems, 2015
Critical thinking/Creative problem-solving/decision making	Archer, 1984; Sowa; 1991; Barak & Doppelt, 1999; Mehalik & Schunn, 2006; Doppelt, 2009; Petrich, Wilkinson, & Beven, 2013; Gomez Puente, van Eijck, & Jochems, 2015; Ryan, Clapp, Ross & Tishman, 2016
Utilize professional skills and domain knowledge skills	Ke, 2014; Gomez Puente, van Eijck, & Jochems, 2015; de Vries, 2006
Iterative design of an artifact/prototyping/use of sketching or modeling	Archer, 1984; Roozenburg & Cross, 1991; Kolodner et al. 2003; Fortus et al. 2004; McKenna, 2006; Cross, 2006; Gomez Puente et al. 2013; Bekker et al., 2015
Open-ended, ill-defined, ambiguity	Simon, 1973; Archer, 1979; Sowa, 1991; Goel & Pirolli, 1992; Jonassen, 1997, 2000; Nelson & Stolterman, 2003; Kolodner et al. 2003; Fortus et al., 2005; Cross, 2006; Mese, 2006; Gómez Puente, van Eijck, and Jochems 2011, 2013, 2014
Hands-on	Papert & Harel, 1991; Gómez Puente, van Eijck, and Jochems 2011, 2013, 2014; Peppler et al. 2016
Problem/project-based learning	Hmelo, Holton & Kolodner, 2000; Nelson & Stolterman, 2003; Smith, 2018
Interdisciplinary	Kafai, Peppler, & Chapman, 2009; Gómez Puente, van Eijck, and Jochems 2011, 2013, 2014
Synthesis/Constructive thinking	Rowland, 1993; Goel & Piroli, 1992; Cross, 2006

Many characteristics of design-based learning experiences mimic the experiences engineers encounter within their professional landscape. In 2001, Findeli wrote an article, "*Rethinking Design Education for the 21st Century: Theoretical, Methodological, and Ethical Discussion*," where he reimagined a design education that was not bounded by discipline but rather taught as a meta-practice for humanistic values within complex systems. Taking that a bit further, there have been a few studies where design projects or project-based learning (PBL) has been highlighted as a possible way of fostering transversal skill development for engineering students (Kamaruddin et al., 2012; Phusavat et al., 2019; Sanchez-Martin et al., 2017). Razzouk and Shute (2012) make the leap and suggest that "design thinking is more than just a skill to be acquired and used in limited contexts. Rather, we view it as a way of thinking and being that can potentially enhance the epistemological and ontological nature of schooling" (p.343). When one grows in their skills in design, they will be more effective at communication, collaboration, creativity, critical thinking, holistic thinking, empathy, imagination, and visualization (Cross, 1982; Lee & Breitenberg, 2008; Lewis & Bonollo, 2002).

4.4. Research Purpose

In an attempt to address the needs of future engineering professionals and the need to develop pedagogical approaches to developing social and emotional or transversal skills in students, this study looks at the learner's perception of potentially using design-based learning experiences to support their development of these skills. The purpose of this narrative case study was to explore a learners' experience with learning transversal skills from an undergraduate course on Engineering Leadership, the

learner's perception on the impact learning transversal skills will have on their future lived experiences and living as their best-loved self and the learner's perceptions on experiencing transversal skills during design-based learning experiences.

4.5. Research Context

The site for this study was an Engineering Leadership course at a Tier 1 Research University with a highly ranked engineering program. There were 29 of the 33 engineering students from the course that participated in the study. Students met for a lecture-style class twice a week and then met for a lab once a week. As part of the course, students also participated in a one-day leadership retreat. According to the syllabus, the purpose of the course was to help students understand the effective practices of leadership, and through this understanding, to help them enhance their own leadership practices and capabilities. Students completed weekly written reflections on various leadership, personality, and emotional intelligence topics. In addition, they created a personal leadership development plan, completed an EQ-i 2.0 (Emotional Intelligence) assessment at the beginning and end of the semester, and delivered a presentation on their growth at the end of the semester.

4.6. Method

This narrative case study utilized the narrative inquiry methodology to study a group of engineering students' journeys explicitly aimed at learning transversal skills. Narrative inquiry explores one's lived experiences (D Jean Clandinin & Connelly, 2000) and for this study, the lived experience was the undergraduate course on Engineering Leadership. This study spanned across one semester with follow-up interviews

conducted after the course was complete. The researcher sat alongside the participants throughout their course as both a way to study their experience and to develop the relationships needed to build trust. Using a purposive sampling process, all students enrolled in the course were given the opportunity to volunteer to be a participant in the study and 29 students out of a possible 35 students consented to participate in the study. Purposive sampling allows the researcher to select participants that would support the understanding of the phenomena being explored (Creswell, 2009).

The lived experiences of participants were examined from two different perspectives. A broad view (Connelly & Clandinin, 1990) was taken by looking at the participants' lived experience learning transversal skills across the entire course. A burrowed view (Connelly & Clandinin, 1990) was adopted by looking at the participants' lived experience with two design-based learning experiences that were situated at the beginning and end of the course. Burrowing allows the researcher to narrow in on a particular phenomenon which in this case, was utilizing transversal skills during design-based learning experiences. Storying and restorying (Connelly & Clandinin, 1990), an additional tool for narrative inquirers, was used to show the shifts the students experienced as they engaged in both the class and the design-based learning experiences. Fictionalization (Clandinin, 2006) was utilized to ensure that the students' identity would be protected, without compromising the plotlines shared about their growth and transformation on the journey.

4.6.1. Broad Lived Experience: Engineering Leadership Course

To help explore the learner's perception of the impact of taking a course aimed at developing transversal skills, a variety of data sources were collected to create the stories needed for data analysis. Class data were collected at the beginning and end of the class through the EQ-i 2.0 assessment and an open-ended survey. A paired t-test analysis was conducted on the EQ-i 2.0 assessment data, and a thematic analysis was completed on the open-ended survey. This data was used to explore the story of the impact of the engineering leadership course.

4.6.2. Burrowed Lived Experience: Design-Based Learning Experience

To help explore the learner's perception on the transversal skills that were evident during the design-based learning experiences, survey data, focus group, and interview data were utilized to help "story" and "re-story" (Connelly & Clandinin, 1990) the participants lived experience with transversal skills during design-based learning experiences. In the first design-based learning experience, students constructed a roller coaster with straws and tape, as shown in Figure 4.2. The ping-pong ball that rolled the furthest upon exiting the roller coaster would indicate the winning team. The picture below is of the winning team's roller coaster.

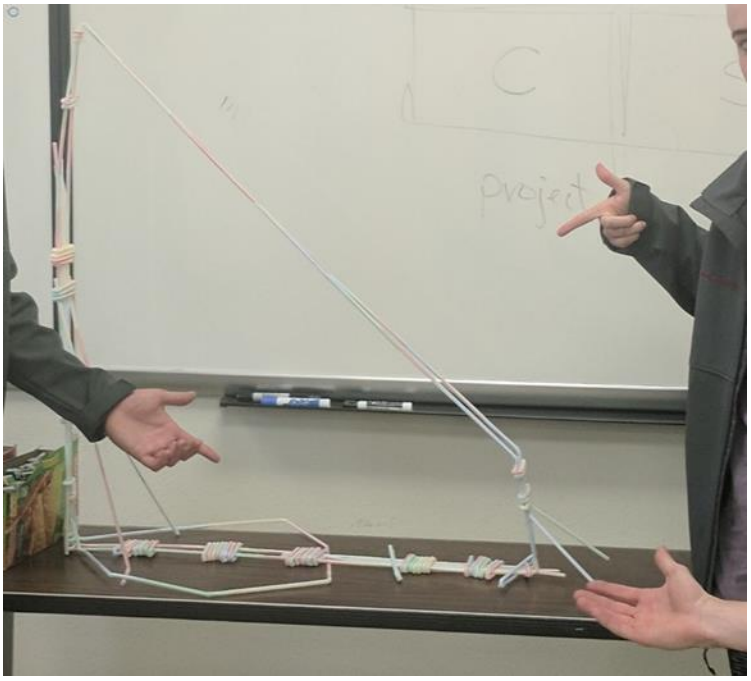

Figure 4.2 The first DBL experience

For the second design challenge at the end of the course, the students participated in constructing a spaghetti tower with a marshmallow on top using only spaghetti noodles, string, and tape as shown in Figure 3. The picture is of the winning team's tower.

Figure 4.3 The second DBL experience.

A class-level narrative was created by highlighting the themes across all the data related to design-based learning experiences, as well as individual narratives of team members as they reflected on those experiences.

4.7. Results

The first component of the results section is a broad view look at the students' perceptions of the impact of the Engineering Leadership course. This is followed by a section on the burrowed view of the students' perspectives on the transversal skills that were evident during the design-based learning experiences. After all the data is presented, the final section will be a look across all the data to discuss insights on flipping the need to develop transversal skills in engineers to using design-based learning experiences to develop transversal skills.

4.7.1. Broad View of Results

To capture the broad view story of the experience, the EQ-i 2.0 data were used to create a visual of the pre and post-test scores, followed by a table that sorted quotes from the students' narratives on their lived experiences of the Engineering Leadership course.

4.7.1.1. EQ-i 2.0 Data

After running a paired-samples t-test on the data, it showed the growth across all the scores to be statistically significant at the $p < .05$ level (see Figure 4), which potentially begins to tell the story of the potentially positive impact engaging in an Engineering Leadership course could have on the development of transversal skills. Figure 4.4 shows the pre and post-test scores for the engineers taking the Engineering Leadership course.

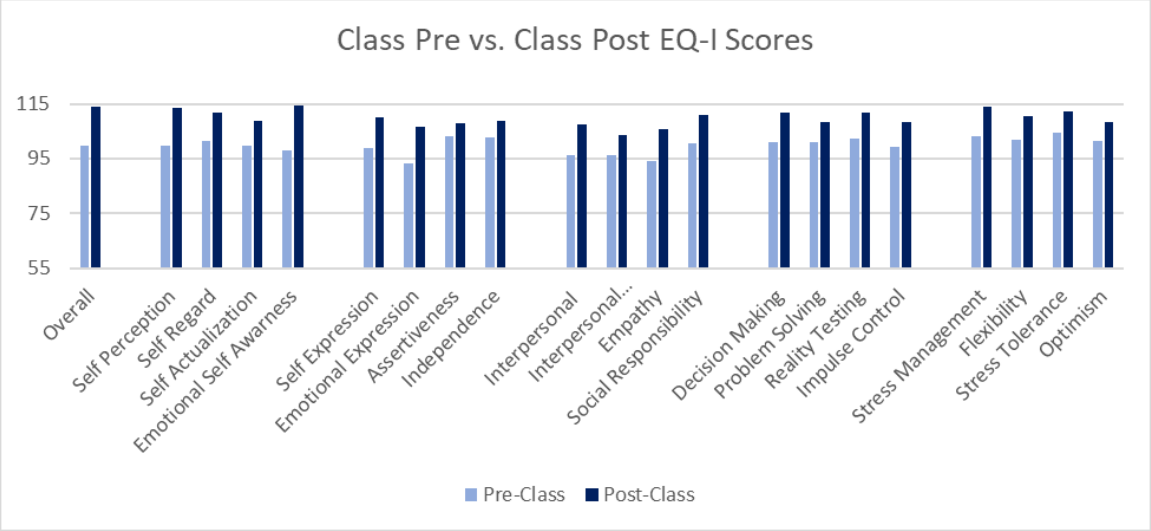

Figure 4.4 Class EQ-i 2.0 scores.

As the data were explored, it allowed for some narrative noticing and wondering to emerge. One noticing was at the pre and post-test, the highest-scoring composite was stress management, and the lowest-scoring composite was the interpersonal composite. Are learner's the strongest at managing their stress, or is that maybe one of the more prevalent and personal experiences that they pay attention to during their undergraduate journey? It also led to wonderings around why the interpersonal composite scored the lowest and how would that show up in their narratives about their friends and family. Why do they perceive their skills to be the weakest in the category? Another noticing was that the sub-group of emotional self-awareness went from being the lowest scored during the pre-test to the highest scored during the post-test. How do they know that their self-awareness grew, and what are they doing with that awareness? What did they feel fostered that growth? Learning or gaining self-awareness can be an emotional and sometimes challenging journey; how did they experience the transformation as they gained more awareness? It was exciting to see the potential promise from their growth, but the next layer of analysis would need to dig into the particulars of their stories that help continue to create the story that might provide insight into their perceived numerical growth.

4.7.1.2. Narrative Data

As students shared their narratives around how this course impacted their lives, they often mentioned the impact it had on their academic success, personal growth, and their relationships with friends and family. Embedded within their stories are some transversal skills that are needed to be successful as future engineers. For this section,

key ideas were extracted from their interviews and sorted across the five composite score categories from the EQ-I 2.0 and three skills highlighted in the Green Report (1994), *Engineering for a Changing World.* A focus on these skills in engineering education programs would help the programs meet industry demands. Highlights from those students' responses are included in Table 4-3.

Table 4-3 Students' perception of impact sorted across transversal skills

Characteristics	Sources
Self-Perception	• It has helped me discover more about myself such as my strengths and weaknesses • The course has been life-changing for me, allowing me to evaluate decisions that I have made from my past • It has made me more aware of how I present myself to others, especially people who do not know me well • I've gained insights into my own weaknesses and how to improve upon them • I have learned a lot more about myself and I've learned I can be a bit too logical, a "stick in the mud" with a lot of things • This class helped me to be aware of my thoughts and actions, and how this mindfulness can go such a long way in developing my character and how I interact with others • I re-evaluated decisions I made when I was younger, and I feel like I have the freedom to plan a different future.
Self-Expression	• I've learned how to regulate my emotions to be more suited to a professional setting • I can manage myself better and I am more mindful of what I am doing • It has made me a lot more aware of how I express my emotions as well as how others see me • I have talked more with classmates and expressed myself a little more. I have been able to open up more to my family • This course has helped me to be more expressive and open in my personal life with those I am close with • It has helped me to better be able to deal with my emotions rather than trying to ignore them • I do not like revealing things about me and I don't reach out to other people as much. After this class, I realized like it's important to do that. And I feel like this semester I've made the most amount of new friends this semester.

Table 4-3 Continued

Characteristics	Sources
Interpersonal	• It made me more aware of my interactions with students and professors • In my relationships with friends, and my girlfriend I am able to understand others better • Made me more aware and present in my social relationships • I have begun working on interpersonal skills and being more empathetic, trying to move away from having a cynical nature. • It improved my interpersonal relationship skills. I gained this by learning the DISC personality type. • I have gained much more experience with empathy
Decision Making	• My ability to plan ahead and use time conscious planning is incredibly useful • Just controlling my responses to triggers by using the AIWATT (Am I willing at this time) and STOP (Stop, take a breath, observe, proceed) methods will help me manage and strengthen my relationships with others.
Stress Management	• I have been able to handle a pretty stressful semester with minimal anxiety and woe some feelings • I have learned to not stress as much • Through learning time management skills, I have never been less stressed and more on top of my course work
Team Skills	• I am better equipped to work effectively in teams, and I now have the skills to better lead the teams • I believe this will take me further than I had ever imagined for myself in leading groups of people
Communication Skills	• Significant improvements in my ability to communicate with others • Effectively communicate with different types of people. • My ability to communicate with others and my ability to listen empathically have improved drastically as a result of this class
Leadership Skills	• I've learned how to regulate my schedule to spend less time procrastinating. • I can adapt my leadership style and modify my approach to the different personality types.

In returning to the narrative wonderings that emerged from the data on the EQ-i 2.0 and how that connected with the stories shared about their experience learning

transversal skills, many students narrowed in on the self-awareness. This coincides with the data that showed emotional self-awareness going from the lowest-scoring category to the highest scoring category in the post-test. Self-awareness is considered foundational to all the other social and emotional skills, and for many participants, they shared that this was the first class they ever took that was focused on 'them.' The thoughts captured that relate to the self-expression composite were of particular interest because you almost see how the self-awareness opened the door to action. Students highlighted learning how to regulate and express their emotions and provided them the gateway to being more open to their family and friends. In the next section, the researcher moved from the narratives of the overall experience and explores the narratives centered around the design-based learning experiences.

4.7.2. Burrowed View of Results

After each design-based learning experience, students reflected on the experience and the transversal skills they felt were evident in those experiences. For this section, key examples (shown in Table 4-4) from each design-based learning experience were extracted from the interviews and surveys and sorted across the six domains of transversal skills identified by UNESCO: (1) critical and innovative thinking, (2) interpersonal skills, (3) intrapersonal skills, (4) global citizenship, (5) media and information literacy, (6) other (UNESCO-International Bureau of Education in Bangkok, 2014). Media and information literacy was not a component of the design-based learning experiences, so it will not be included in this list. Listed under each domain category are examples provided by UNESCO of the critical skills, competencies, values,

attitudes needed to develop capability within each domain. Within an awareness that some areas could be moved to different domains and that the list was not exhaustive, UNESCO created the "other" domain, and it was left intentionally blank so the domains could be adapted to context, so for this study the other section was used to capture components of leadership that do not seem to have a place within the other domains. To protect the anonymity of the research participants, if a name was provided it was removed, and a P was put in its place to represent a participant.

Table 4-4 Student perception of transversal skills in DBL

Domains	Sources
Critical and Innovative Thinking (creativity, resourcefulness, application skills, reflective thinking, reasoned decision-making)	• We struggled a little when testing the design because we all had different ideas on how to fix it and make it better and we couldn't come up with something solid. • This caused as a little bit of trouble because after we brainstormed, we were not sure to which plan should we stick. • We had a really creative idea to stabilize our coaster (stabies); also, we tried a couple different designs to find the best launch angle and structure • That's just it, there was no real decision-making process. We started with a slurry of ideas and tried to include all of them. • It wasn't just him, but we could have upscaled the roller coaster. Him and others focused on making the device "architecturally" sound. We didn't experiment with any innovative designs. • We were not very creative, undoubtedly having the simplest design out of the rest of the groups. • We were having a tough time finding a good way to attach all of the components together. I suggested one way, but we quickly found out that wouldn't work. P suggested we just use the rest of the tape which seemed to be a quicker solution. • You had to simulate in your mind because we really only had time to prototype once. • When we were building the base, we destroyed it two times. We recover by restating what we did wrong in our own words so that we would not repeat it a third time.

Table 4-4 Continued

Domains	Sources
Interpersonal (communication, teamwork, collaboration, empathy, compassion)	• We all contributed ideas to the group • I believe everyone felt comfortable throwing out ideas when they saw fit. No one was demeaning when suggesting ideas which definitely helped the team in providing an open environment for thoughts. • They all talked at once and tried to finish each other's sentences. At one point we were able to have individual people talking at one time. • He was a good leader although did not do much to the collaboration of the idea, he would ask questions that were good for others to get a better result • We were more than willing to change our design. It helped us to come to a final product and we were all accepting of that. A strength would be teamwork and understanding each other's ideas very well. • She would be loud and get distracted and not offer many good ideas • Towards the end we all were working together a lot to get it built and we were communicating a lot (like the last 45 seconds) • All of us communicated pretty well to accomplish what we were envisioning; P marked the design on the white board to help get us all on the same page. • Communication was quite tough given such a small amount of time. I explained my idea and started building relatively quickly while P and P talked to each other about how to connect things together. • We all pitched in and when we encountered a problem, we would just try to use tape and not really talk. No one really did this part. Communication is needed during the whole time. • When we didn't fully understand why a teammate was building a certain part off the structure, we made sure to ask and they respond promptly. • Frustration; it was verbally expressed between team members and was also visible in body language. • Given the way they were speaking and how they were responding, the lower time went, the more nervous they became, and it showed. The two of them wanted to get to a point of being finished. Once we hit the 5-minute mark, we all silently agreed that "Once it stands, it stays." • P got flustered and frustrated when I stopped him due to lack of communication

Table 4-4 Continued

Domains	Sources
Intrapersonal (self-management, self-awareness, flexibility and adaptability, perseverance, self-motivation, self-compassion)	• We were making constant changes trough the challenge. We even scrapped the entire design for a new one at the end. • I made sure that everyone was given the opportunity to put forward ideas and helped manage the differing idea's inside our group • I was excited for the challenge as I enjoy designing and creating things. I also felt annoyed when the design was not working due to the limited time, and that due to those changes the design unstable. • I would change myself because it is rude to try to change someone else. • I need to be more vocal and better at expressing myself. I was quite most of the time and would try to find something that I could do to help. • I wouldn't want any of them to be my boss because I feel I am more qualified to be honest. • Somewhat stressed because I got in a bit late and the clock was ticking, but I responded to that stress by jumping to action, which spurred everyone else to work simultaneously. • I was a bit upset at the beginning because one of our members started early. Later I was unsure if we would be able to get the project working. When it did work, I was relieved. • I felt pretty calm, even with the pressure of the clock. I think I was a bit too relaxed, just wanting to have a structure that I could be happy to look at. Even so, I was happy to contribute where I could, having a good time. I was a bit worried about details that were unnecessary, however. • Apart from the fact that some of the group members were also confused about the design at first, I feel like the main emotion was anxiousness due to the time. Although we came up with the design fairly fast, we spent a lot of time discussing it and thus began to run out of time. • Probably stressed out with the time limit. P kept talking about it, the other two would ask for the time every now and then. When a time was called, we would start rushing and getting sloppy. • stress tolerance helped me to not lose focus when under pressure • Impulse control- I didn’t let myself shut anyone out and was calm throughout the challenge. My impulses would have normally made me a little more stressed with the short amount of time

Table 4-4 Continued

Domains	Sources
Global Citizenship (tolerance, openness, responsibility, respect for diversity, ethical understanding, intercultural understanding, democratic participation, conflict resolution, sense of belonging)	• Most decisions were handled democratically, whenever there was an impasse, I made the final decision • He had the diplomatic approach, but he still fielded everyone's ideas and gave us a course of action. • Probably decision making and conflict resolution. We all knew that we did not have a lot of time and thus had to come up with something quick. This meant that we all agreed with one another fairly easily since we did not want to be the one to hold the group back. In turn this led to very little conflict since we conceded to the general consensus of the group.
Other (Leadership)	• P and P were the ones at the beginning who had all the ideas. The rest of us would input our ideas, but it was mostly their ideas that was implemented. • I tried to make sure everyone's ideas were heard and if someone wasn't talking, I would ask them how they felt about it to make sure everyone was on the same page • We worked well together but I think P was definitely a good middle ground who wanted to listen to everyone's input and make sure she understood our ideas. • I kind of took the lead on the project pushed my design on the team without asking for different opinions but the team didn't object too much as we were all worried about the time constraints • Maybe I'm the one who needs to be changed so I act sooner. • I think it would be interesting to see how the design challenge would go if the team had to choose a leader at the beginning of the challenge. In our case, there wasn't really anyone who took the lead and kept it. • P would probably be the boss, he listens well, does the work and is good at delegating. I wouldn't want B to be the boss since she talks a lot and it's all about her ideas. • P was crucial to help us handle our stress while we were building the base of the tower. I played an important role in this aspect because I gathered information from everyone and summarize it so that we could communicate effectively. • I believe P was the overall leader. He was a coercive leader. • I would probably say the boss would be P. He was straight forward and able to guide everyone on the team in controlled and effective manner. • I want to say P was the team leader, seeing as he was the main one employing an authoritative goal and asking for our opinion only when needed. • I would choose P because he is exceptionally talented at organizing groups and deliberating conflicts. I would not choose steven because even though he provided the most creative input, he often went forward with ideas without first discussing them

4.7.2.1. Personal Narratives of the DBL

Moving from the highlights from narratives across the categories of transversal skills, this section shares an up-close view of four students' narratives of their perspective of the two design-based learning experiences. Alongside their experiences are reflective comments their teammates made about the student as they made their own meaning of the experience.

4.7.2.1.1. David

In reflecting on his thoughts, emotions, and actions during the first design challenge, David felt he "did well in making sure everyone was doing what we decided to assign and making sure everyone had their voice heard when it came to new ideas." He explained how he was "happy to be in a group that allowed for total collaboration between all members, and I was satisfied by our end result...we were lucky that the group dynamic was conducive to hearing from everyone and making decisions that we all agreed upon." In looking at classmates' reflections from their surveys, they mentioned David and how they experienced him as captured in Figure 5. While some saw him as engaging all members of the group and their ideas, others appeared to see him through the lens of being authoritative, and one team member saw him as someone in the background assisting.

Figure 4.5 1st DBL team reflection comments on David.

In reflecting on the second design challenge, David stated, "I tried my best to be the leader of [interpersonal relationships] through bringing ideas from all team members to light, having an open discussion on which idea we all thought would be best, and acting from there to create the design." He went on to say that he believes he "led the team to work collaboratively, pitch their ideas without fear or reprimanding...I did my best to ensure we all agreed with what ended up being our final design." When asked who he would change on his team, he discussed the person that was not outspoken and did not "contribute to the pool of ideas" because it felt like he was "pulling teeth to get him to put in his two cents." When asked who he would want as his boss, he described the person on the team that he thought was "exceptionally empathic and seems to have a great grasp on working in group dynamics.

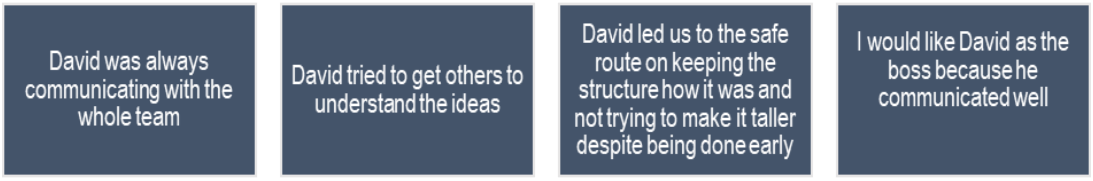

Figure 4.6 2nd DBL team reflection comments on David.

4.7.2.1.2. Katie

In reflecting on the first design experience, Katie "felt like my brain was being stimulated for once, which was a nice touch...I also felt some pressure. I felt like a team player and part of something larger than myself." Katie described how "everyone worked on separate tasks to piece together at the end...but everyone had input and agreed upon the design." She felt she personally experienced frustration, as well as the others on her team, but they were open about it and had "team discussions" to work through conflict. When ideas they were implementing failed, they would "take input from others who were working on different tasks" and adjust. A teammate discussed her having many ideas to put limitations, but it is not possible to discern from that statement whether they were frustrated by her limitations or if they thought it was a positive contribution.

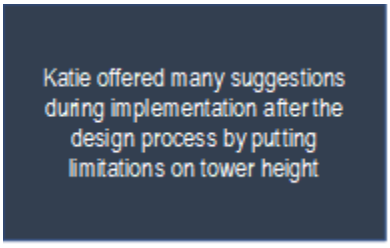

Figure 4.7 1st DBL team reflection comments on Katie.

In reflecting on the second design experience, Katie felt "exasperation," and her team was very "frustrated because the design was not working as planned." While their solution was not as "good as planned," and they "ran into problems, [the team] threw out ideas and quickly went with one." She felt that "through democratic conversations, the team generally came to a joint conclusion rather than someone taking charge." Overall the process was " stressful because of the time" constraint and "frustrating because one person was always watching the time." She felt like you needed to be "assertive" and good with "problem-solving" to be effective and engaged with the challenge.

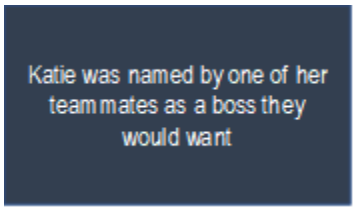

Figure 4.8 2nd DBL team reflection comments on Katie.

4.7.2.1.3. Samuel

In reflecting on the first design experience, Samuel felt "frustration at members in disagreement...stress because constantly checking the time." He reflected that the stress the team was feeling was "defused by humor from me and two other teammates." One member of the team he felt "asked a lot of questions about the design and time, but it wasted more time than it helped, as we had a majority yes before, he jumped it." He felt there was no leader for the team because it was overall democratic and authoritative. It was democratic, and they debated, but the "final say was divided between me [S] and Marco." In describing the person he did now want as a boss, Samuel shared he "didn't

seem like he had much positive impact on the productivity of the team." The person on the team he would want to be his boss, "had ideas before we started, and he seemed to keep us on track." While S thought there was no leader, and all contributed equally, some comments provided by teammates felt S had the final say, whereas others felt like S did the least. Those comments contrast up against the others that name him as the best leader of the group.

Figure 4.9 1st DBL team reflection comments on Samuel.

In reflecting on the second design experience, Samuel felt the team "worked well enough together to accomplish the task." He thought he started the creative process of designing with "ideas about length" and then passed on to another teammate who "took over with the overall designs." He described the teams as "fairly relaxed...and able to freely communicate." He felt the process was "competitive [with] some stress from the time limit. Decisions were made by "just going with the first idea presented." He was happy with all teammates because none of them were "holding us back." When asked who on the team he would want to lead, he named himself because of his "coaching-style leadership." He mentioned a different teammate who he would not want to be his boss because he didn't "seem confident in himself." While engaging in the design challenge, he saw the need for "flexibility" and glimpses of "self-actualization." The comments from his teammates seem like they could align with his thoughts on self-actualization because he was performing in ways that demonstrated his strengths as evident through his knot tying ability and his ability to explain complicated things.

Figure 4.10 2nd DBL team reflection comments on Samuel.

4.7.2.1.4. Emma

In reflecting on the first design challenge, Emma felt "lost in all of the commotion and felt like I couldn't really say anything. They liked to talk over each

other, and I just felt like it was a waste of time to say something….they had more important ideas." There were two people on the team that were "throwing out a lot of ideas," and while the "rest of us would input our ideas...it was mostly their ideas that were implemented." She went on to conclude, "I need to be more vocal and better at expressing myself. I was quiet most of the time and would try to find something that I could do to help…. I thought about things but didn't really talk." When asked which person on the team she would want at her boss, Emma named the person that she felt "listens well, does the work, and is good at delegating." When describing the person, she would not want to be her boss; she named the person that "talks a lot and it's all about her ideas….[she doesn't realize] others would like to talk too." The comment (see Figure 11) made by a teammate happens to be the one that in Emma's opinion did not leave room for another voice, so they have conflicting narratives within the same experience.

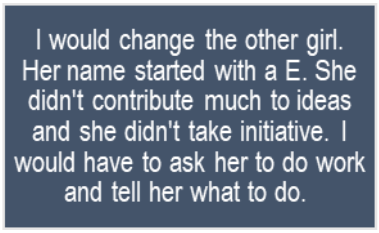

Figure 4.11 1st DBL team reflection comments on Emma.

In reflecting on the second design challenge, Emma felt her team failed because it "got too ambitious," and when we "encountered a problem, we would just try to use tape and not really talk. No one really [communicated], and communication is needed during the whole time." She really didn't think there "was a strong leader during this

activity, we each did our part and would help each other when needed." As a team, we were "stressed about time...and when the time remaining was called, we would start rushing and getting sloppy." When choosing a boss from this team, Emma wanted the person who "listens and seems to care. He knows what he is doing and is able to get us to follow his lead." She did not want the person who she felt was "a bit upfront and doesn't really know when to close his mouth and let others talk." She felt "communication and active listening" were the critical skills that impacted their engagement and, ultimately, the outcome of the challenge. Compared to the feedback from the first design-based learning experience, Emma was seen as the one that was communicating the most, despite her feeling that there was no communication during the challenge.

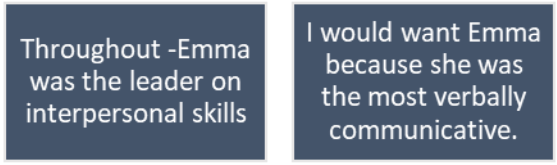

Figure 4.12 2nd DBL team reflection comments on Emma.

4.8. Discussion

This study simultaneously explored how explicitly teaching engineering students transversal skills might fill the need being demanded by industry and how utilizing engineering design-based learning experiences might be a vehicle for supporting the development of the transversal skills in students. First, the results on the impact of explicitly teaching engineering students and how that might support the needs of

industry, engineering education, and students are discussed. Next, the transversal skills evident in design-based learning experiences are explored. Lastly, narrative wonderings about the next stages of exploration are needed to more fully understand how design-based learning experiences can be utilized to support the development of transversal skills in students.

4.8.1. Meeting the External Needs While Opening the Door to Personal Change

The results of this study align with past studies that have shown that emotional intelligence can be improved with learning (Goleman, 1995; Boyatzis et al., 2002). The numerical story of this study shows significant growth across the overall EI, five domains, and 15 subgroup scores on the EQ-I 2.0 test after the participants went through a course aimed at developing those transversal skills. In a series of studies completed by Boyatzis and his colleagues, (2002, 2008, Boyatzis and Cavanagh) the researchers found that after students completed a course aimed at developing emotional-social intelligence, the improvements lasted five to seven years, they increased in their emotional-social intelligence by 61 percent if a full-time student within one to two years and 54 percent within three to five years if they were a part-time student (Boyatzis, 2008). Those results were compared to students who did not complete a course in emotional-social intelligence, and those participants only had a three percent increase. With the clear evidence across the literature to support that emotional-social intelligence can be learned and that it positively impacts their personal and professional life, more MBA training programs are including it within their courses, but it is still sparse within other areas of concentration, including the engineering context. While this study does not show the

long-term impact of such courses in an engineering students' life, it does give voice to the students, and in their self-assessment of their transversal skills measured within the EQ-I 2.0, they perceive noticeable change.

Moving from the numerical story of change to the story of change shared by the students participating in the class, their perception of how learning about these transversal skills built their capability to better understand themselves and others as a path to improving their academic, future professional and personal contexts begins to emerge. From their EQ-I 2.0 assessments, the students collectively rated emotional self-awareness the lowest of all measured skills before the course, and collectively they ranked it the highest during the post-test. Students mentioned across their narrative how their awareness of self and others has shifted. For example, one student shared, "it helped me discover more about myself, such as my strengths and weaknesses." For another student, "it made me a lot more aware of how I express my emotions as well as how others see me." For many that awareness marks the beginning of lifelong learning as it sparks them to see changes they could make that led to improvements or perceived improvements across their academic, future professional and personal contexts. Academically, students shared how "through learning time management skills, I have never been less stressed and more on top of my course work" and "I have been able to handle a pretty stressful semester with minimal anxiety and 'woesome' feelings.

With the engineering industry wanting students with more effective team, communication, and leadership skills, the students perceived learning about these transversal skills to impact all three domains. For example, one student shared how he

felt, “I am better equipped to work effectively in teams, and I now have the skills to better lead the teams”. Another student felt their “ability to communicate with others, and my ability to listen empathically have improved drastically as a result of the class.” A third student thought he would be able to “adapt my leadership style and modify my approach to the different personality types.” While this study does not apply an external measure on that change, for example, a measure to see if the student can actually adapt their leadership style, it does seek to provide a lens into the students perception on how this course may have supported their development which is what the National Association of Colleges and Employers (2018) listed as the most desirable skills of new graduates. If one goal of education is preparing them for contributing to society, then the education we are providing would need to prepare them in the most desirable skills.

While this course was designed to develop the skills being demanded by industry and to make them more equipped for their future jobs, what came out across the shared stories was the profound personal impact learning these skills had by altering many relationships they had across their different landscapes. For one student, he simply stated, “in my relationships with friends and my girlfriend, I am able to understand others better.” For another student, she was able to “talk more with classmates and expressed myself a little more, and I have been able to open up more to my family.” For another student, it opened the door to building new relationships, for as she reflected back, she shared, “I do not like revealing things about me, and I don’t reach out to other people as much. After this class, I realized like it’s important to do

that. And I feel like this semester I've made the most amount of new friends this semester."

An individual's desire for high-quality relationships is often connected back to Baumeister & Leary's (1995) finding that we have a need to belong and then connected forward as fundamental to our well-being (Argyle, 2001; Myers et al., 2000). In exploring the students experience with this course, it struck me that while it provides a potential piece of the solution needed to meet the demands of the industry through more aligned learning in higher education, it almost more importantly provides a piece of the solution to meet the need in supporting a students' path to well-being. As Simon Weil (2002) stated, "to be rooted is perhaps the most important and least recognized need of the human soul."

4.8.2. Creating the Conditions for Knowing Transversal Skills in Action

Rowland (1993) suggested that design has the potential to teach us to recognize "human factors such as communication, power, and anxiety as well as any conflict of interest that arises" (p.82). If design has the potential to teach us, how might we utilize those design experiences in a way that contributes to knowing? In 1999, Davis et al. interviewed teachers on utilizing design-based learning experiences. They found that they felt the experiences built flexible thinking skills, developed interpersonal and communication skills, and cultivated responsible citizens. While teachers have that perception, this study addressed the opposite of that to explore what skills students perceived to be part of the design-based learning experience. Utilizing UNESCO's domains for transversal skills to sort the student responses, students perceived critical

and innovative thinking skills, interpersonal skills, intrapersonal skills, global citizenship skills, and other leadership skills to be evident in those experiences.

As students reflected-on-action (Schön, 1983), they were able to narrow in on those experiences and elicit insights into their thoughts, emotions, actions, and interactions with others through the lens of transversal skills. For example, one student reflected on the fact that there was "no real decision-making process…we started with a slurry of ideas and tried to include them all." Imagine that in the professional context, where a team in an organization was applying no decision-making processes but instead trying to include everything. This demonstrated an experience where the members of the team needed to be willing to enter into cooperative conflict to help facilitate team decision-making and to enhance the level of detail in the decision selection (Damasio, 1994). Without the willingness to enter into the conflict, organizations struggle with creating viable solutions and long-term sustainability.

While avoiding conflict has potential negative impacts on a team's performance, engaging in conflict arguably harms the team as well. Three types of conflict have been identified in teams: relationship, task, and process (Jehn, 1995). Relationship conflict is found to have the most negative impact on team performance (Soren & Sumati, 2010) followed by process conflict (de Wit et al., 2012), and then task conflict does not have a stable positive or negative impact on research regarding team performance. In looking at student reflections on their design-based learning experiences, one student remarked, "they all talked at once and tried to finish each other's sentences. At one point, we were able to have individual people talking at one time." How productive can a team be if

everyone is talking over each other? What does that behavior say about the team? How would talking over your teammates impact the relationships on the team, as well as their processes and ultimately the teams' performance? Another student felt that "apart from the fact that some of the group members were also confused about the designs at first, I feel like the main emotion [I experienced] was anxiousness due to the time. Although we came up with the design fairly fast, we spent a lot of time discussing it and thus began to run out of time." Imagine that in the workplace, a team of people stressed out by deadlines caught between more fully developing an idea or making the deadline. That example included the potential of conflict across all three categories; confusion on the task, time management, and decision-making issues within the process and anxiety or stress-driven behaviors that have the potential to enter the relationship dynamic. Another student claimed, "I kind of took the lead on the project and pushed my design on the team without asking for different opinions, but the team didn't object too much as we were all worried about the time constraints." Imagine that leader who only implements their ideas and rationalizes it with their own reasoning. How does that impact the psychological safety of a team and limit team members' ability to speak up? Would you want that student as your future leader?

4.8.3. Design the Transition from "Knowing" to "Doing" Transversal Skills

Leadership is neither a science nor an art; it lives in the space between; design lives in that same space. In the process of developing professional excellence, Schon (1983) argued for an "epistemology of practice implicit in the artistic, intuitive processes which some practitioners bring to situations of uncertainty, instability, uniqueness and

value conflict" (p.49). No one theory dominates the way each student should act during those design-based learning experiences, but within their actions on the team as they design and create their solution to the challenge, lies the insight into these students current places of knowing, doing, and being in the uncertain, unstable, unique and often conflicted environments they will encounter as both team members and as leaders. Situated in this same space between theory and practice, Latta and Buck (2008) maintain that "the gaps persistently wrestled with between theory and practice is embraced through embodied knowledge" (p.323). Building off of Latta and Buck's notion of embodied knowledge as the connection between theory and practice, Bresler (2006) claimed that the space between theory and practice is experience and it could only be addressed through the intersection of the persons' thinking, feeling, doing, and being. If we want to develop the embodied knowledge embedded in practice, we need the practical experiences where students can experiment with what theory says when it is rubbed up against practice, so they can more fully develop the personal practical knowledge needed to not only lead others, but to lead self.

Craig et al. (2018) defines embodied knowledge as "not simply knowledge of the body, but knowledge dwelling in the body and enacted through the body" (p.329). If we imagine that enactment in design-based learning experiences, we can see the transfer of knowing as it is enacted through the body into the design of the solution to the challenge. Davis and Littlejohn (2017) claim that DBL has the strong potential to develop transversal skills, but Oxman (2001) found that to develop those skills, there would need to be a shift from emphasizing the product to a more fine-tuned focus on the process of

design learning. The potential in the shift lies in the combination of what Schon's refers to as the reflection-on-action and the reflection-in-action. Leaders need to be able to reflect-in-action to make strategic moves to navigate the situation (Koh et al., 2015). In imagining the stories the students shared of their reflection-on-action in the design-based learning experiences, if an intervention was placed to force them to reflect-in-action across perspectives, we could begin to expose them to a potential developmental path towards more enhanced critical and innovative thinking skills, interpersonal skills, intrapersonal skills, global citizenship skills, and other leadership skills. Consider how the personal narratives shared on the design-based learning experiences aligned or misaligned with another team members perspective of what was happening. For example, Emma was frustrated with her teammate that would talk over everyone and not let others have voice causing her to not say anything, whereas that exact teammate thought Emma wanted to change her off the team because she did not contribute ideas or take initiative. How might that have played out differently if they both gained awareness in action of how their behaviors were impacting each other?

4.9. Reflecting Forward

While this research shows the potential of intentionally focusing on transversal skills as a path to better-preparing students for the engineering workforce and that within those engineering design-based learning experiences, the transversal skills are alive, more research is needed to support deeper learning of these skills through action. Knowing about what empathy is, is a very different kind of knowing than being empathic or feeling the impact of someone else being empathic to you. By embracing

the value of experience-based learning within our formal education system, moving past solely having learners reflect-on-action (still an underutilized pedagogical approach), and pushing towards creating the pedagogical shifts required to support reflecting-in-action is needed. Such efforts are beginning to be explored, for example, van Diggelen et al. (2019) used the grounded theory approach to create a model for coaching in design-based learning, but that is just the beginning. The demands of industry call for a different type of knowing than the demands of the past which were more rooted in the notion of knowledge, so as education explores the potential shifts that need to happen to support that shift, we have to consider the value we place on developing technical skills over transversal skills, the value we place on product over process and the value we place on learned or learning.

5. DESIGNERLY WAYS OF BECOMING YOUR BEST-LOVED SELF: STORY CONSTELLATIONS OF ENGINEERING STUDENTS LEARNING TRANSVERSAL SKILLS

While emotional intelligence or transversal skills can be learned and improved upon (Mocanu & Sterian, 2013; Turner & Lloyd-Walker, 2008), it is often overlooked or put at a lower priority than technical or academic intelligence (Jones et al., 2013). By focusing on developing more than just a learner's intellectual growth, we have the potential to positively impact not only their academic outcomes but life outcomes as well (Brackett et al., 2004; Lomas et al., 2019; K. A. Moore et al., 2015). OECD (2017) found more ties between SEL skills and life satisfaction than cognitive skills and life satisfaction. Bar-On (2010)found that higher levels of emotional-social intelligence have a significant effect on human performance, happiness, well-being, and the quest for the meaning of life.

For Dewey (1938), education is experience, and ongoing experience is life. Schwab (1954) stated that "education cannot…separate…the intellectual from feeling and action, whether it is the interest of one or…the other" (p.108). Amidst his interconnected and humanistic view of education, Schwab made particular efforts to value self-agency. Seeing humans as "self-moving living things," able to "produce itself," "develop itself," and to create a 'personal history'(Schwab, 1964, p.8). For Schwab, that ability to develop itself opens the pathway to living as your best-loved self (Schwab, 1954/1978; Craig, 2013). Schwab and Craig define best-loved self as experiencing more satisfying lives. In living as your best-loved self, Schwab connects it

beyond a “state of mind” to a state of knowing through the feelings of “fire” and “eros,” a state of doing through “liberated” actions, and a state of being through living their purpose through the possession and enactment of “knowledge or skill.” In accepting Schwab’s notion of knowing your best-loved self, it cannot come in the form of technical knowledge, but rather it comes from an integrated way of knowing through mind, body, heart, and spirit (Craig et al., 2018).

This research journey explores how undergraduate engineering students perceive learning skills beyond the technical, impact their future lived experiences and what they imagine as living as their best-loved self and how they come about to their new ways of knowing. This study dives into the experiences of four students (two male and two female) whose common lived experience was learning transversal skills during an Engineering Leadership course at a Tier 1 University. Transversal skills are those skills that transcend disciplines or more formally defined by UNESCO (2013) as “skills that are typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings.” While they lived a common experience, this study gives voice to their individualized sense-making as they reflected on their past experiences, learned knowledge about transversal skills within their present experience (the course), and then reimagined their future lived experiences as they experimented with developing these transversal skills.

5.1. Theoretical Roots

The theoretical underpinnings for this study are narrative inquiry, lived experience as curriculum, and designerly ways of thinking, doing, being, and becoming.

5.1.1. Narrative Inquiry

Built upon the belief that education is experience and ongoing experience is life (Dewey, 1938) and that experience happens narratively (Clandinin & Connelly, 2000), "narrative inquiry is a form of narrative experience…therefore, educational experience should be studied narratively" (Clandinin & Connelly, 2000, p.19). In narrative inquiry, "researchers acknowledge that since context matters, human interaction and humans are embedded in context, and people, cultures, and events have histories," and "one's setting cannot be effectively decontextualized" (Pinnegar & Daynes, 2007, p. 11). In exploring one scene from four engineering students' journey to knowing, doing, being and becoming their best-loved self, we could not decontextualize their experience and thus narrative inquiry must serve as both the method and methodology. In sharing the participants stories, there is no intention to "assert a specific view of how things are" but rather include the "wondering, tentativeness, and alternate views" of each individually contextualized experience as the participant gave their new knowledge "meaning, nuance, and application (Pinnegar & Daynes, 2007, p.25-27) and they journeyed to knowing a new version of their best-loved self.

5.1.2. Lived Experience as Curriculum

Dewey saw education and experience as interwoven or deeply connected, allowing one to conceptualize 'lived experience' as curriculum (Clandinin & Connelly,

1992). Within each experience, there is a constant negotiation between the individual and others, the ideas, concepts or topics, and the context with a hope that through the nature of deliberation, a sense of harmony arises as decisions are enacted, and experiences are lived (Connelly, 1972). In the first of a series of four "Practical" papers, Schwab (1969) highlighted the complexity of what he calls a 'commitment to deliberation' as described in the following quote:

> *Deliberation is complex and arduous. It treats both ends and means and must treat them as mutually determining one another. It must try to identify, with respect to both, what facts may be relevant. It must try to ascertain the relevant facts in the concrete case. It must try to identify the desiderate in the case. It must generate alternative solutions. It must make every effort to trace the branching pathways of consequences which may flow from each alternative and affect desiderate. It must then weigh alternatives and their costs and consequences against one another, and choose, not the right alternative, for there is no such thing, but the best one." (p.20)*

By introducing the idea of the *desiderata*, things needed or wanted, to the stage of decisions, the freedom of choice in lived experiences as curriculum take center stage because there can't be one set path, but only the 'best one' for the particular players within a specific scene. As the internal deliberations meet external negotiations through actions, the knowing shifts from merely residing in the mind to embracing the embodied ways of knowing in body, heart, and spirit, and it is through this lens that one has the potential to redefine what the 'best one' might be. When living in this domain of internal meeting external, experience or practice, we are centered in what Dewey called inquiry: "thought intertwined with action, reflection in and on-action, which proceeds from doubt to resolution of doubt, to the generation of new doubt" (Schön, 1995, p. 31). Using Dewey's notion of inquiry, we can imagine the continuous iterative process of

learning as one spends a lifetime continually redefining, re-imagining, and redesigning what their future best-loved self might be.

5.1.2.1. Becoming Through Lived Experience

Jarvis (2006) views learning as the complex journey of reflecting on, emotionally responding to, and acting on the results from an external interaction, and in turn, a person is transformed through the experience. His model looks at the process a person changes during a lived experience and could be described as both experiential and constructivist (Jarvis, 2009). Using Jarvis' model as a guide, during the storying and restorying of the narratives for this research experience, particular attention was paid to include the emotions, thoughts, and actions the participants experienced and reflected upon (see Figure 1). By utilizing this model, the change from the beginning of the class to the end of the class could be explored more deeply in terms of developing into or becoming their best-loved self through the learning of transversal skills.

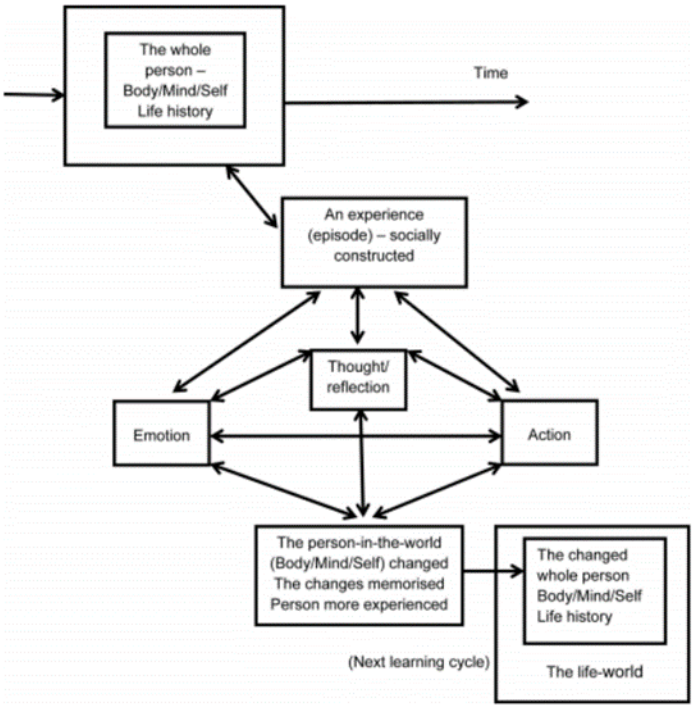

Figure 5.1 Jarvis' model of the transformation of the person through experience. (Jarvis, 2006, p.23)

5.1.3. Designerly Ways of Becoming Your Best-Loved Self

Just as transversal skills transcend disciplines, the capability to engage in creative problem solving or utilize design thinking often requires an understanding of technical content, as well as thinking that spans disciplines or 'transdisciplinary thinking' (Mishra et al., 2013) and it doesn't reside in just one discipline, but rather it is a way of life. Learning to create and design can be developed, but it can only be learned by doing for it involves approaches to thinking or a mindset, rather than a set body of knowledge that can be taught (Henriksen et al., 2016). One needs to experience the designerly ways of creating the 'best one,' so they do not make the mistake of assuming what is best based

on knowledge instead of the empathic and embodied insights within designerly ways of knowing (McKenney et al., 2015b).

In their article, *Rethinking Technology & Creativity in the 21st Century: A Room of Their Own*, Mishra et al. (2014) shared the story of Brasilia. An architect, Oscar Niemeyer, designed what he thought would be the best city-based on modern aesthetics with the best architecture, and it was even named the federal capital for Brazil. As people began to claim this place as part of their best-loved self story, they found sidewalks to be nonexistent, divided silos within the city (one for banking, one for restaurants, etc.) and they had no access to an intersected way of living as they ate, shopped, interacted, and slept. Failing to meet their needs, the people now quickly leave the city on weekends, so they can enjoy a more intersected way of living their best life in a city designed for their needs, wants, and desires for interaction. When decisions are only made in the mind without awareness or an attempt to discover how those decisions will be experienced as they enter the world, we fail to embrace the power of prototyping and iterating. Prototyping is essential to the design process and support the designer in coming up with the 'best for now' solution. Building off of Craig's (2013b) notion that best-loved self is deeply intertwined with 'teacher as curriculum maker' and 'stories to live by' it is through these designerly ways of knowing and doing that one can 'develop itself' into the best-loved self story they live by.

In this research journey through the narratives of experience with learning transversal skills, we see the unfolding of prototyping and iterating as the participants enact their learned knowledge into practice, reflects on that experience through thoughts,

emotions, and actions, and then embrace how they were changed by that experience as they imagine moving closer to becoming their best-loved self. The next section describes the methods, and then we enter into the four students' stories as our contexts collided as researcher and participants sitting in this Engineering Leadership course.

5.2. Method

While narrative inquiry was employed as the method, the story constellations tool was employed to support the data analysis (Craig, 2007). According to Craig (2007), the "story constellation approach illuminates [participants] unfolding contextualized experiences over time" (p.186), but it does not "produce a script to be followed nor plans to be implemented" (Davis, 2003, p.ii). Story constellations allow for multiple perspectives to co-exist in the same research space without forcing one participant's story on others. As the learning of transversal skills are both personal and social in nature and not confined to the context of the undergraduate engineering course, story constellations allow for both the contextualized experience of the class and the personal contextualized experience of the participants to have a voice in this study (see Figure 2). Along with the story constellation tool for Narrative Inquiry, Maxine Greene's (1995) notion of "seeing big" and "seeing small" was used to help shape the methods for collecting data. For Greene (1995), "seeing small" allows us to detach from the experience and look for patterns and trends over time, whereas "seeing big" will enable us to narrow in on the up-close particularities embedded within a person's narrative.

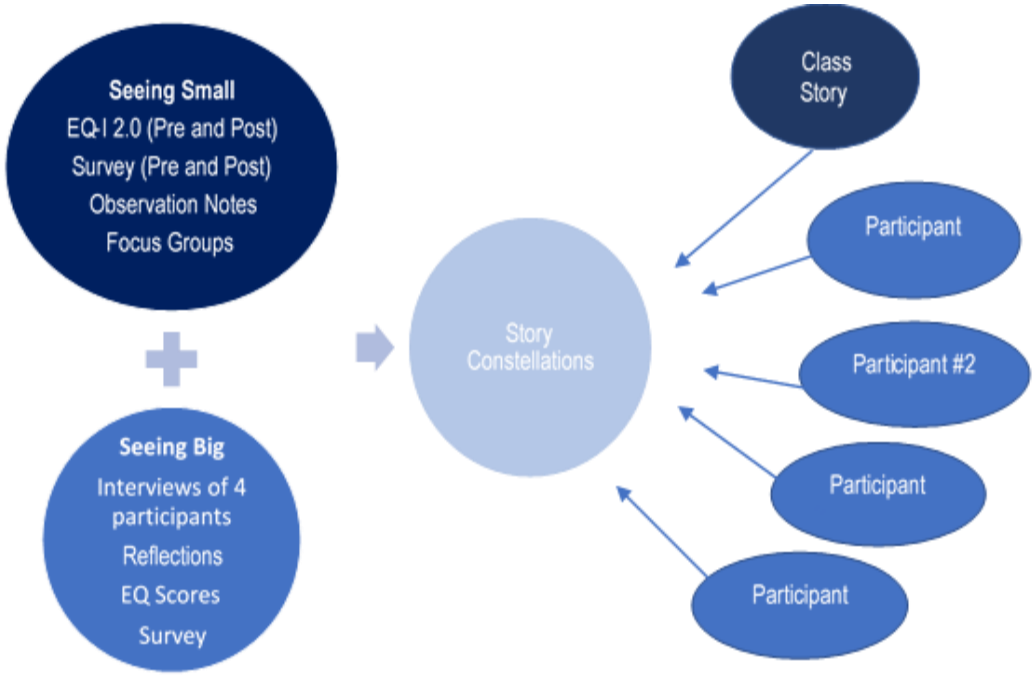

Figure 5.2 Co-existing stories on this research landscape.

The researcher sat alongside the participants as they engaged in a semester-long course aimed to develop their leadership skills for the engineering context. The participants took an emotional intelligence self-assessment prior to the course and then again at the end of the course. The EQ-i 2.0 assessment was utilized, and it is based on Bar-On's model (see table 1) for measuring emotional-social intelligence. No statistical analysis was done on the individual students' scores, but rather it was used to create visuals of one component of their learning experience as it unfolded over the semester.

Table 5-1 15 Subscales of the EQ-i 2.0

Subscales	Definition
Self-Perception Composite	
Self-regard	Respecting oneself, confidence
Self-Actualization	Pursuit of meaning self-improvement
Emotional Self Awareness	Understanding own emotions
Self-Expression Composite	
Emotional Expression	Constructive expression of emotions
Assertiveness	Communicating feelings, beliefs; non-offensive
Independence	Self-directed, free emotional dependence
Interpersonal Composite	
Interpersonal Relationships	Mutually satisfying relationships
Empathy	Understanding; appreciating how others feel
Social Responsibility	Social consciousness; helpful
Decision Making Composite	
Problem Solving	Find solutions when emotions are involved
Reality Testing	Objective; see things are they really are
Impulse Control	Resist or delay impulse to act
Stress Management Composite	
Flexibility	Adapting emotions, thoughts and behaviors
Stress Tolerance	Coping with stressful situations
Optimism	Positive attitude and outlook on life
Well Being Composite	
Happiness	Satisfied with life content

Throughout the semester, the students participated in weekly lectures and a lab, wrote reflections, attended a one-day leadership retreat, and developed a personal leadership development plan as the semester-long project. Observation notes were collected, surveys distributed, and interviews and focus groups were conducted as the experience unfolded. Together all the data were used to "story" and "re-story" (Connelly & Clandinin, 1990) the participants lived experiences.

This ‘truthlikeness’ of this study was developed through ‘narrative resonances’ (Conle, 1996) across the ‘narrative exemplars’ used for the story constellations (Lyons & LaBoskey, 2002). Still, it is ultimately the “readers who judge the extent to which our narrative accounts …[are] trustworthy. They decide whether [the] research study informs their knowing and contains semblances of truth that are actionable (Lyons & Laboskey, 2002) in their respective places and situations” (Craig, You, & Oh, 2017, p. 761). The shift of power and authority thoughtfully moves to the participants and the reader. By moving away from privileging the capital ‘T’ truth often found in purely quantitative research methods, narrative inquiry privileges the narrative truth (Spence, 1982) of the “lifelikeness” (Bruner, 1986, p. 11) residing within the narrative exemplars (Lyons & LaBoskey, 2002) that address the “credibility, transferability, dependability, and confirmability” (Gay et al., 2006, p. 403) of this study.

5.3. Story Constellations of Learning Transversal Skills

In the following section, a series of stories are introduced. We begin with the “seeing small” narrative of the class experience with learning transversal skills. Then we move into the four individual narratives (see Figure 3) co-existing within the milieu of the Engineering Leadership course. Figure 5.3 shows how this section will move from “seeing small” with the class narrative to “seeing big” with the individual narratives. After that, resonances across stories through the lens of becoming your best-loved self are explored.

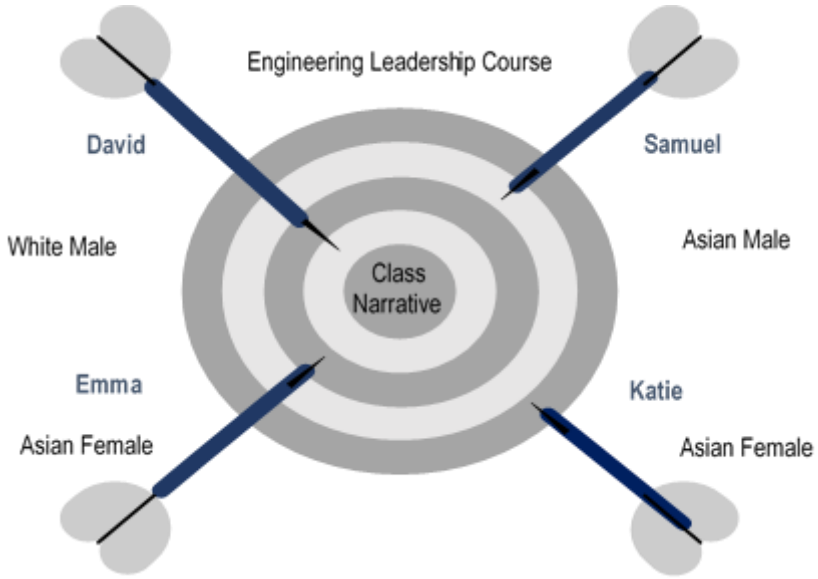

Figure 5.3 The story constellations for this study.

5.3.1. The Class Narrative

Overall the class-level data supports the claim that the Engineering Leadership course had a positive impact on the students' perceptions of their ability to utilize the transversal skills learned during the course. Based on a simple paired t-test, there was noticeable and statistically significant growth from pre-course to post-course on their self-rated EQ-I 2.0 scores are across all domains. Upon looking at their pre-course scores, the overall class strength was the stress management composite, along with subgroups of stress tolerance and assertiveness. Their overall lowest scoring area was the interpersonal composite, along with the subgroups of emotional self-expression and empathy. After completing the course, the class's highest-scoring subgroup was emotional self-awareness, and the lowest-scoring subgroup was interpersonal

relationships. A visual representation of the class pre and post-scores is depicted below in Figure 5.4.

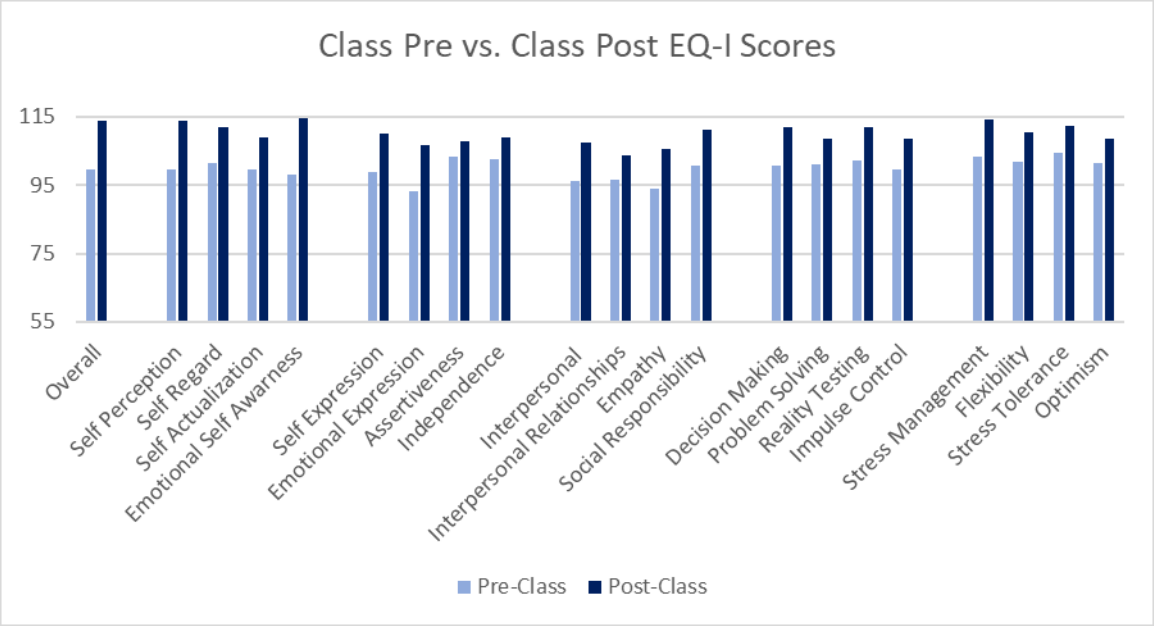

Figure 5.4 Class EQ-i 2.0 scores.

In unpacking the class narratives on change, participants discuss how "the course has been-life-changing for me, allowing me to evaluate decisions that I have made from the past" or "I re-evaluated decisions I made when I was younger, and I feel like I have the freedom to plan a different future." Other narratives shared discussed the regained power they feel over their thoughts, actions, and emotions. For example, one student shared, "I can manage myself better, and I am more mindful of what I am doing." Another student shared, "I have been able to handle a pretty stressful semester with minimal anxiety and woe some feelings." Another student shared, "I learned to regulate my schedule to spend less time procrastinating." All students were able to share something they had implemented and how it was positively impacting their life. We will

now move from the class narrative to explore four students within the class and they're up-close or “seeing big” view of how the class impacted them.

5.3.2. David

David is a white male engineering student who came into the Engineering Leadership course during a time when he was having academic struggles. He was dealing with a possible suspension from the school or academic probation. He was able to appeal the suspension based on the grounds of sleep apnea that he was not treating. The appeal was granted, but he “needed to get [his] act together.” In looking at his scores from pre to post-test, he made gains in all areas (see Figure 5). He came in with a score for self-regard, and emotional expression in the high range (110-130) and his score for independence was in the low range (70-89). All his other scores fell in the mid-range. After taking the course, all his scores shifted to the high range except for interpersonal relationships, social responsibility, and flexibility, which all fell in the mid-range.

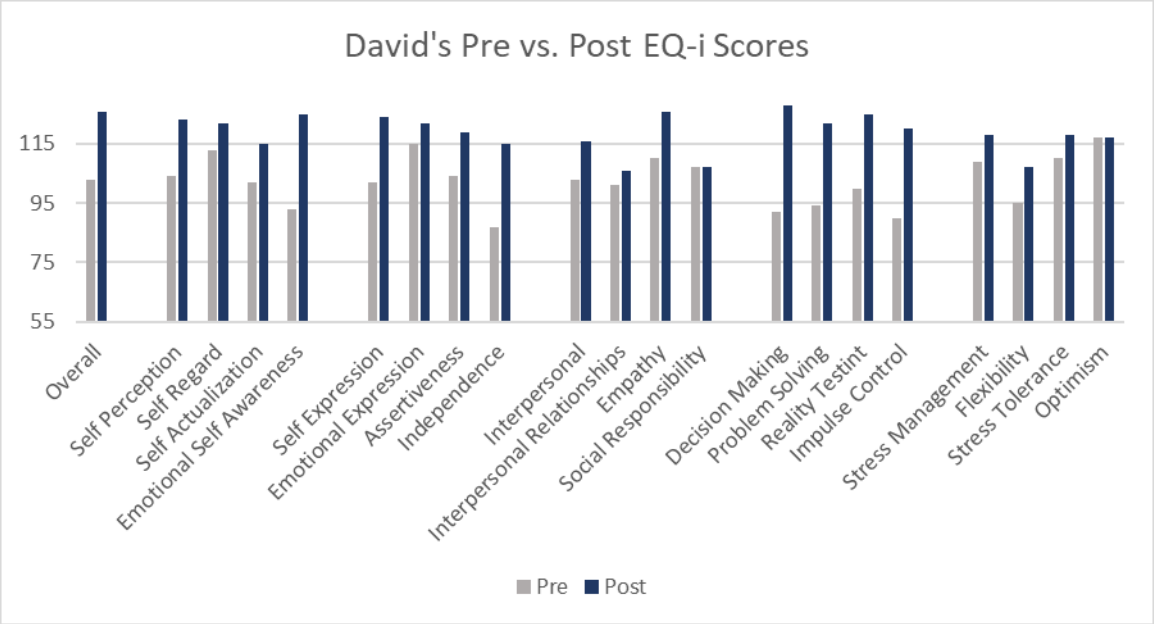

Figure 5.5 David's pre and post-course EQ-i 2.0 scores.

In comparing himself to the class average at the time of the pre-test, he scored himself higher(≥ 10) than the class average in self-regard, emotional expression, empathy, and optimism (see Figure 6). He scored himself lower(≥ 10) than his peers in independence. At the end of the course, he scored himself higher(≥ 10) than his peers in every category except for self-actualization, interpersonal relationships, social responsibility, flexibility, and stress tolerance (See Figure 7).

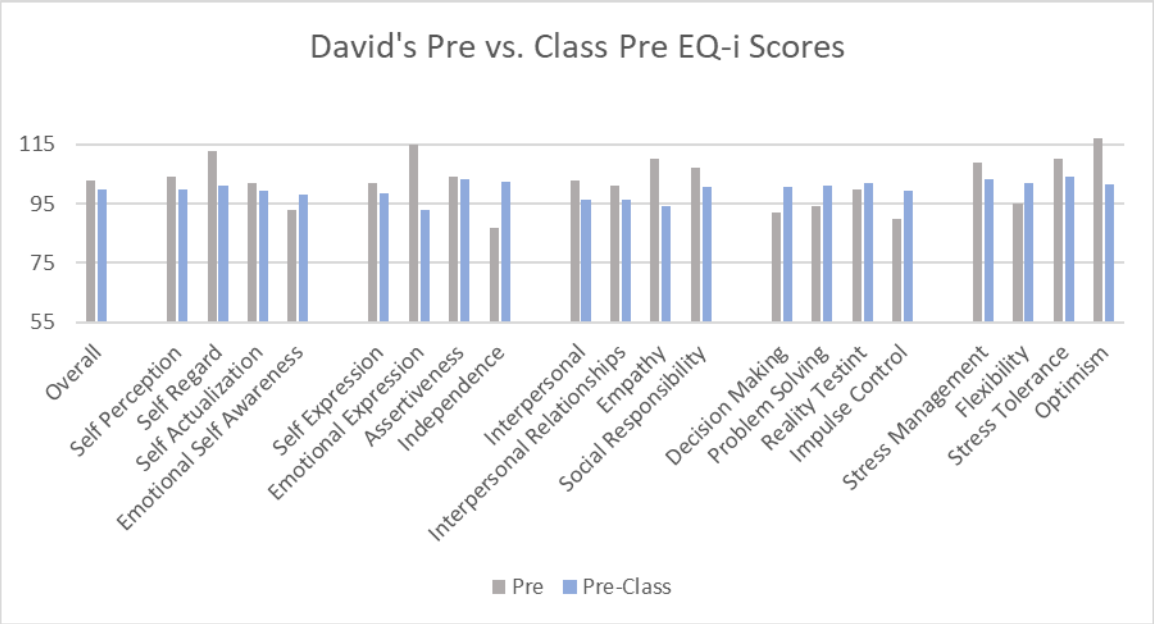

Figure 5.6 Comparing David's pre and the Class pre-EQ-i 2.0 scores.

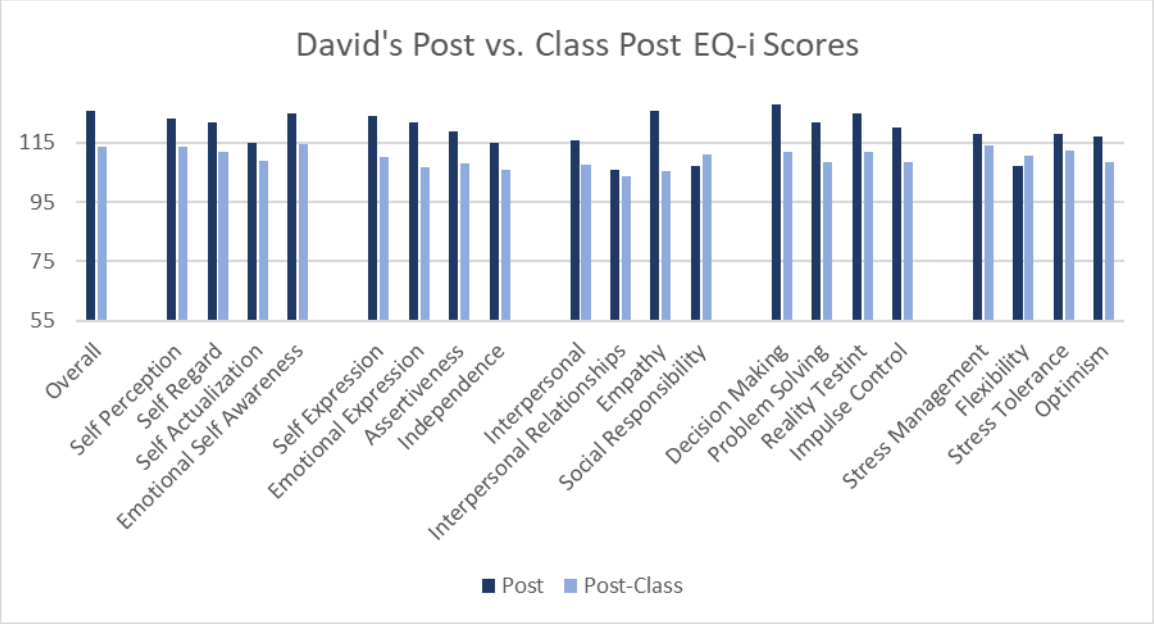

Figure 5.7 Comparing David's post and the Class post EQ-i 2.0 scores.

In reflecting back on how he ended up in engineering, David shared how it began with a "desire for money," but after failing some core classes, especially the math courses, he had to give up the chance of joining the petroleum engineering major. Instead, he was given limited options and ended up within his current concentration within the School of Engineering at a Tier 1 University. When asked how he felt about that, David replied, "[I] couldn't be happier about it because it is my personality. I am not a numbers guy; I am a people guy."

In reflecting on his current experience taking this course, he felt it had "opened his eyes to taking more care of himself." He stated, "Prior to this semester, I was complacent in where I was at and where I was going...optimism was high on my EQ test. Looking back on that, it was too high because I thought no matter what I did and whatever habits I formed, it would not detract from my success." David was also "shocked to see on the first EQ test that my self-regard was one of my highest competencies." He went on to look at his past and described that "since freshman year following a bad break up, I have had growing insecurities which have been detrimental to my success in my academic and personal lives."

Through the assessment, David realized that his weakness or area for potential growth might be emotional independence, which he described as "relying too heavily on other's thoughts and actions on how it made me feel….it made sense, I probably care too much about what other people thought and let that change my peace of mind." David had been living with a difficult roommate who he described as "[getting] a weird joy of getting under my skin...and last semester and the first part of this semester I would really

let him, you know, I don't know...it helps a lot when he is bothering me and getting under my skin to just take a breath." In learning through this course, he realized the importance of "knowing others, knowing how they act, and then how to deal with it." It allowed him to reframe a situation he was struggling with (his roommate) in a way that freed him from the emotional turmoil this roommate was causing him.

As the course unfolded, David noticed that as he learned about different aspects of himself and emotional intelligence, he felt there were experiences where "I would not have acted that way prior to this semester" or put another way in the past he may have chosen a different approach to act or react to the situation. For example during a welding lab, "one guy in the group was really afraid of fire, and you know welding is spooky, but he was pretty timid, and I tried to gently encourage him...but I was also aware of the others in my group and their frustration," but he didn't let that change his peace of mind about supporting the student that was afraid. In looking at his present, David shared that "this class helped me to be aware of my thoughts and actions, and how mindfulness can go such a long way in developing my character and how I interact with others."

David feels he has "made changes this semester that I never would have thought possible. Through learning time management skills, I have never been less stressed and more on top of my course work. I know exactly what my goals are and how to reach them, which are traits I truly didn't believe I had the capacity to understand before this semester." He went on to say, "in learning about different personalities and conflict management, I have learned what type of person I am, gained understanding on the

personalities of others, and how to interact with each type." In looking to his future, "he believes this will take me further than I had ever imagined for myself in leading groups of people, making my way up whatever company I start at, and interacting with others in ways I know will be beneficial for all."

5.3.3. Emma

Emma is an Asian female and has one of the highest averages within her concentration within the College of Engineering at a Tier 1 University. At the time of the last interview, she already had a potential job offer that stemmed from her internship at a top engineering firm. One of her professors mentioned in passing that "she would be going places." In looking at her self-rated scores from pre to post-test, she had an increase in all areas, except for optimism, which she remained the same (see Figure 8). She started the course with scores falling in the high range for flexibility and the low range for self-regard, self-expression composite, emotional-expression, interpersonal composite, interpersonal relationships, reality testing, and stress tolerance. After taking the course, all her scores shifted out of the low range, and they fell within the mid and high range. The scores where you saw the most significant gains were in emotional self-expression and interpersonal relationships.

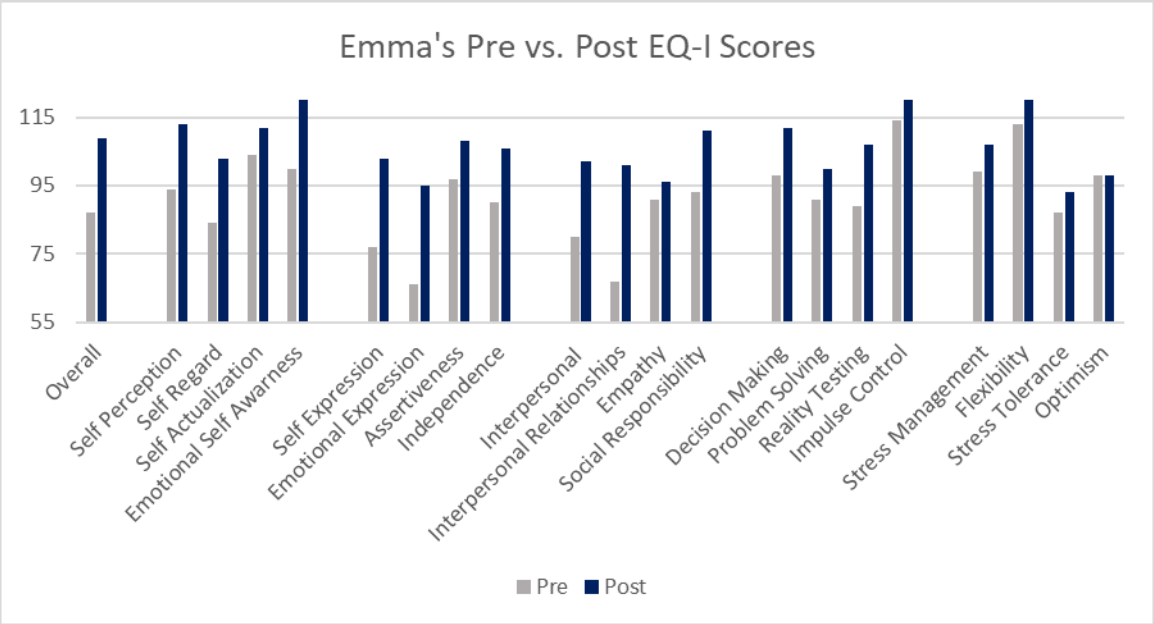

Figure 5.8 Emma's pre and post-course EQ-i 2.0 scores.

In comparing herself to the class average, Emma scored much higher than her peers' average score in impulse control and flexibility at the time of the pre-course test (see Figure 9). She scored much lower than her peers in self-regard, self-expression composite, emotional expression, interpersonal composite, interpersonal relationships, problem-solving, reality testing, and stress tolerance. After the course, she was still much higher than the class in impulse control and flexibility, but she was only much lower in emotional expression, stress tolerance, and optimism (see Figure 10).

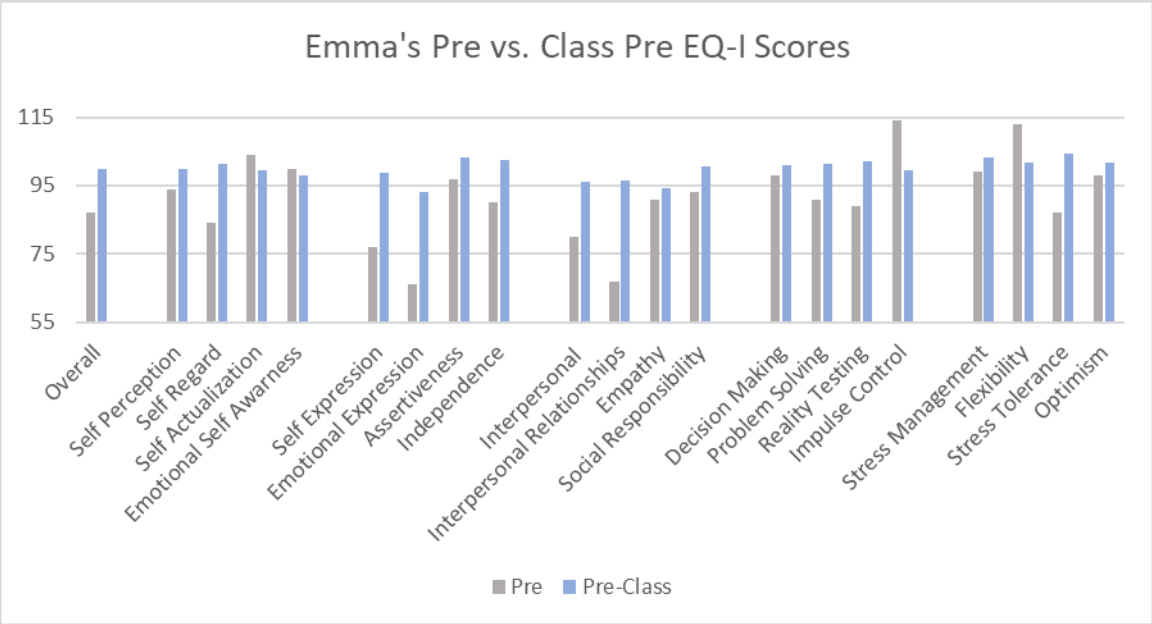

Figure 5.9 Comparing Emma's pre and the Class pre EQ-i 2.0 scores.

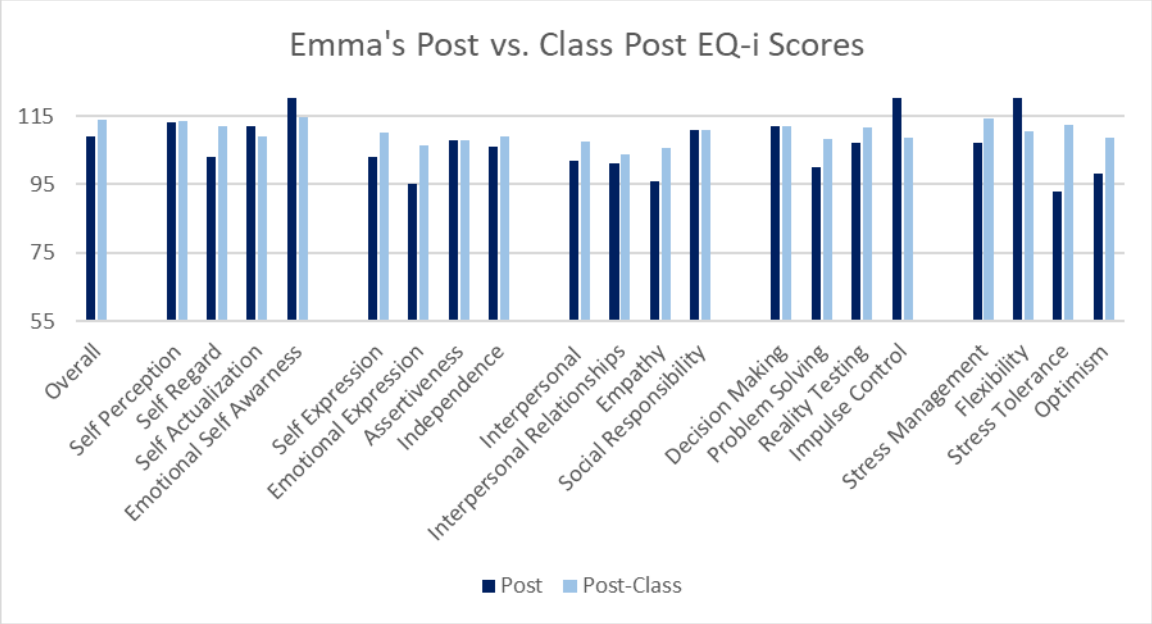

Figure 5.10 Comparing Emma's post and the Class post EQ-i 2.0 scores.

In reflecting back on how she ended up in engineering, she remembered a time in middle school where you could bring your kid to work. Her dad took her to his engineering firm, and she smiled as she remembered that "I got to fly a virtual airplane. That was cool...it was hands-on." As she started to set that dream into action, she came to one of the top universities for engineering with the hope of doing "mechanical engineering" because it was "a broad engineering and I could go do many things." She did not get accepted to that concentration, so they gave her what she "assumes" she put as her "second choice." When I asked her what she wanted to do with her degree, she replied, "I have no clue, I don't know," but she did have an internship lined up at one of the top engineering firms.

In reflecting back on her take-a-ways from the class, she described "leadership..how to interact with people...I will be the team capstone leader, so I'm leading like five other classmates...but we all have different personalities...so I have to figure out how to communicate with others." She went on to describe how it has helped her in social settings, "I do not talk with others because I feel like I'm very awkward and I just stand there and just hope we have a conversation." This class helped her warm-up in talking with others, but she still felt it was a struggle.

When asked if she would retake the class, she replied, "I would take it again. It has helped me, I got to open up to my sister and talk more...but um, I didn't really improve with my parents like I wanted to….I'm afraid she [mom] is going to judge me…she doesn't have a filter. She just says what she wants to say…like I ordered a ring...my Grandma came over and I was excited telling her about it, and then my mom

says out loud, 'honestly, I think it's ugly.'" Emma thought, "Oh, thanks, mom." She went on to reflect that "if she [her mom] could keep her mouth quiet, I would feel, I don't know, a little bit easier to communicate...my dad has told her many times about it, but she thinks she is just telling us the truth."

In describing how the class was beneficial, Emma went on to discuss how the conflict management strategies helped her [learn] to "go through the stages on how to do it [more effectively]" impacted her because she "likes to avoid things." She finds she is "better about it [conflict] when it comes to schoolwork...I can, I'll be able to confront the people if they're slacking and stuff. I can get mean, but I don't know...it'll be interesting to see" how it plays out in the capstone course.

Emma worked most on "emotional expression" and planned to keep "working on that" and "hanging out socially." In sharing more about that, she described how she does not "do that here" [school], and she purchased a dog "specifically just to be my buddy here because that's how lonely I am." She went on to say, "I am not interested, or I don't care for parties...most people party or something. That's not my thing...I guess engineers are mostly introverts, but so we don't talk to each other...there's some, I guess...but I guess I stick with leaving school at school and just my life is just, I guess family."

She continued, "usually, you don't think much about yourself," so when she reflected throughout the semester, she realized when "it comes down to it, I have something" [to say about myself]. In catching back up with her later after the internship, Emma had begun to plan her exit from engineering in a few years and transfer into a

career with a law enforcement agency. The summer internship experience sparked her reconsider if the engineering field was a place where she could help people and make a difference in the world.

5.3.4. Samuel

Samuel is an Asian male who transferred from a community college to a top university for engineering. Samuel's self-rated scores for the pre-test fell in the high range (110-130) for reality testing, and stress tolerance, the low range (70-89) for the self-perception composite, self-actualization, impulse control, and optimism and all other scores fell in the mid-range (90-109). For the post-test scores, he fell in the high range for emotional self-awareness, flexibility, and stress tolerance, and all other scores fell in the mid-range. Based on his self-ratings, he scored himself much higher at the end of the course in the self-perception composite, self-actualization, self-expression composite, emotional expression, and optimism. He scored himself lower in interpersonal relationships, reality testing, and stress tolerance (see Figure 11).

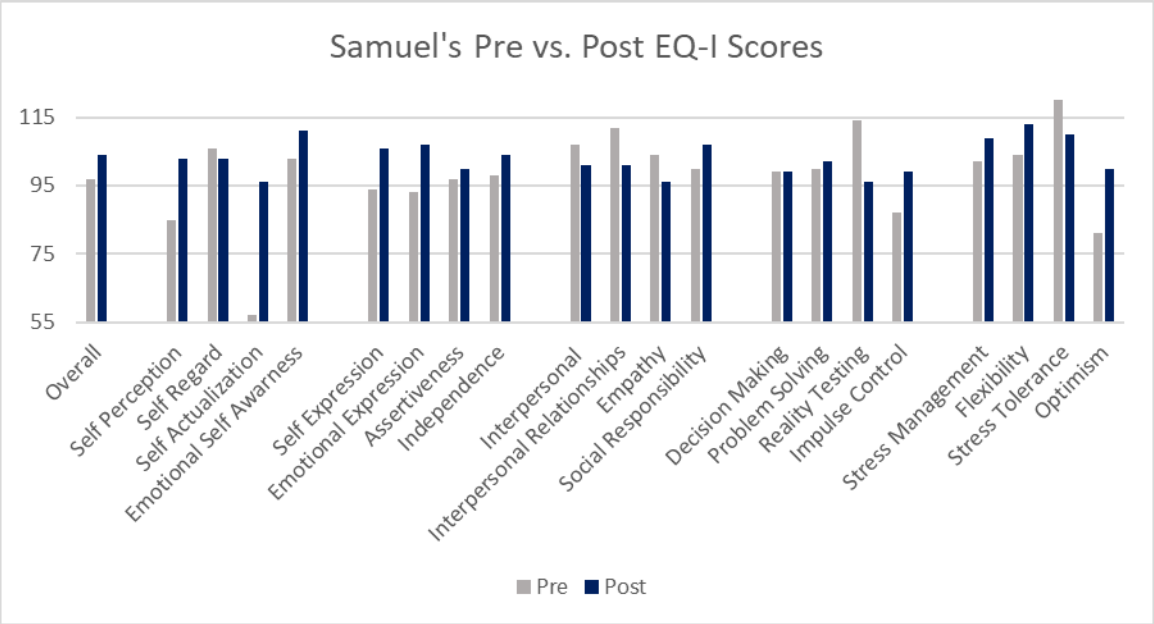

Figure 5.11 Samuel's pre and post-course EQ-i 2.0 scores.

In comparing his scores to the class average, Samuel scored much higher than his peers' average score in the interpersonal composite, interpersonal relationships, reality testing, and stress tolerance (see Figure 12). He scored much lower in the self-perception composite, self-actualization, impulse control, and optimism that his peers. After the course, his scores were not higher than the class in any category, but he did score himself much lower than the class in self-perception composite, self-actualization, decision-making, and reality testing (see Figure 13).

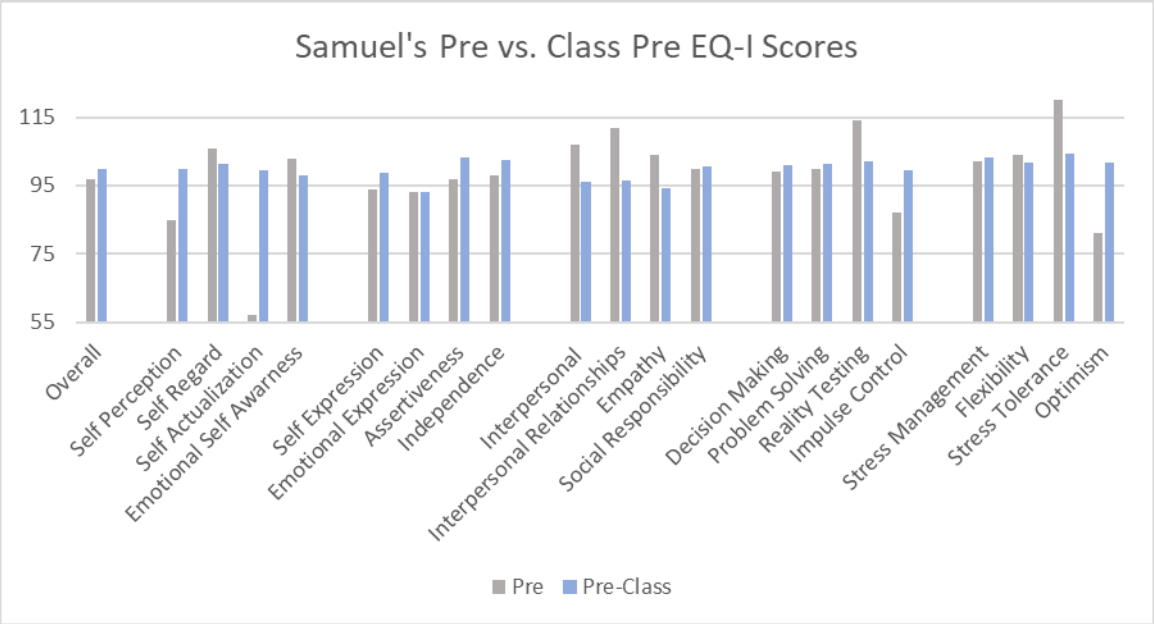

Figure 5.12 Comparing Samuel's pre and the Class pre-EQ-i 2.0 scores.

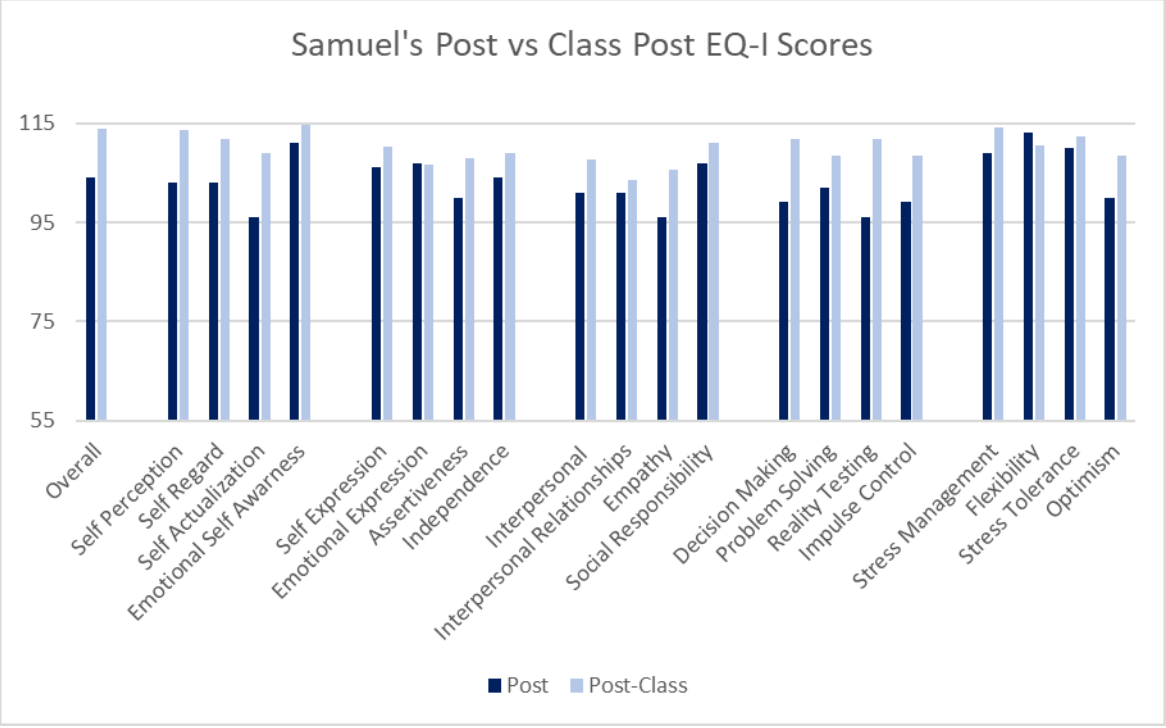

Figure 5.13 Comparing Samuel's post and the Class post-EQ-i 2.0 scores.

In reflecting back on his journey to the field of engineering, Samuel thinks he has wanted to be in the STEM field since middle school. Initially, he was considering computer science but did not get into the program because, as he described, “I was not good at computer science...it was hard for me to code on my own.” What he did find out through that experience was that he “was a good collaborator, so when [he] talked to his advisor, they recommended his current major. When asked about how he felt about his new major, he said, “yes, it is a lot more interesting and has the real-world applications I like...I can focus, pay attention, and lead.”

In reflecting on the Engineering Leadership course, Samuel thought it was a good class, but the reflections were “too long...and didn’t interest my personality...just a waste of time...makes me disconnect [with the purpose of the reflection].” He did reflect that content from the course “such as conflict management and the DISC personalities I have noticed a lot in my daily life.”

In looking at his personal contexts, he went on to describe how “my mom and brother want things done their way, and they don’t care what other people think, and I feel like I have been able to communicate a little easier and get my point across.” From that, he has gained awareness that “I am an avoider...I don’t try to solve things; I just take the beating.” He went on to say that by “trying to be less of an avoider and actually trying to fix and resolve things…it is better...and more satisfying.”

While Samuel has “never had to do that [reflections] in another class,” he feels that it is “very valuable for every major and for people in general” to have a class like this and learn the “ability to reflect on oneself.” When asked to describe the impact the

class had on him, he shared, " [It] made me more motivated to actually work on assignments…[I feel] I can adapt my leadership style and modify my approach to different personality types...and it has improved my interpersonal relationship skills."

5.3.5. Katie

Katie is an Asian female student that loved both chemistry and engineering but ended up pursuing the engineering route at a Tier 1 University. Based on Katie's self-rated scores on the EQ-i 2.0, she did not score herself higher at the end of the course in any category but did score herself much lower in self-actualization, emotional self-awareness, emotional expression, assertiveness, decision-making composite, problem-solving, and impulse control (see Figure 14). Katie's self-rated scores for the pre-test fell in the high range (110-130) for impulse control, the low range (70-89) for problem-solving, reality testing, stress management composite, flexibility, and stress tolerance and all other scores fell in the mid-range (90-109). The post-test scores fell in the high range for empathy, the low range for overall EI, self-perception composite, self-actualization, emotional self-awareness, self-expression composite, emotional expression, assertiveness, decision making, problem-solving, reality testing, stress management composite, and flexibility, and all other scores fell in the mid-range. It was interesting to the researcher that Katie scored herself much lower at the end of the course.

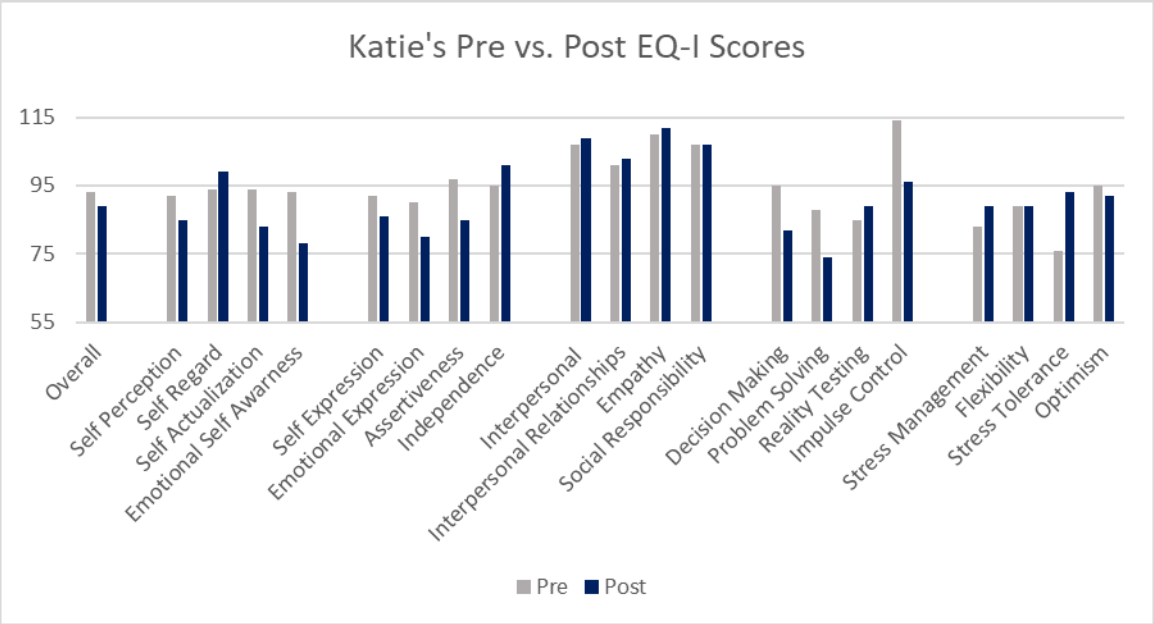

Figure 5.14 Katie's pre and post-course EQ-i 2.0 scores.

In comparing her scores to the class averages before taking the course, Katie scored much higher than her peers' average rating in interpersonal composite, empathy, and impulse control (see Figure 15). She scored much lower in problem-solving, reality testing, stress management composite, flexibility, and stress tolerance than her peers. After the course, her scores were not higher than the class in any category, but she did score herself lower than the class in every category except the interpersonal composite and empathy. (see Figure 16).

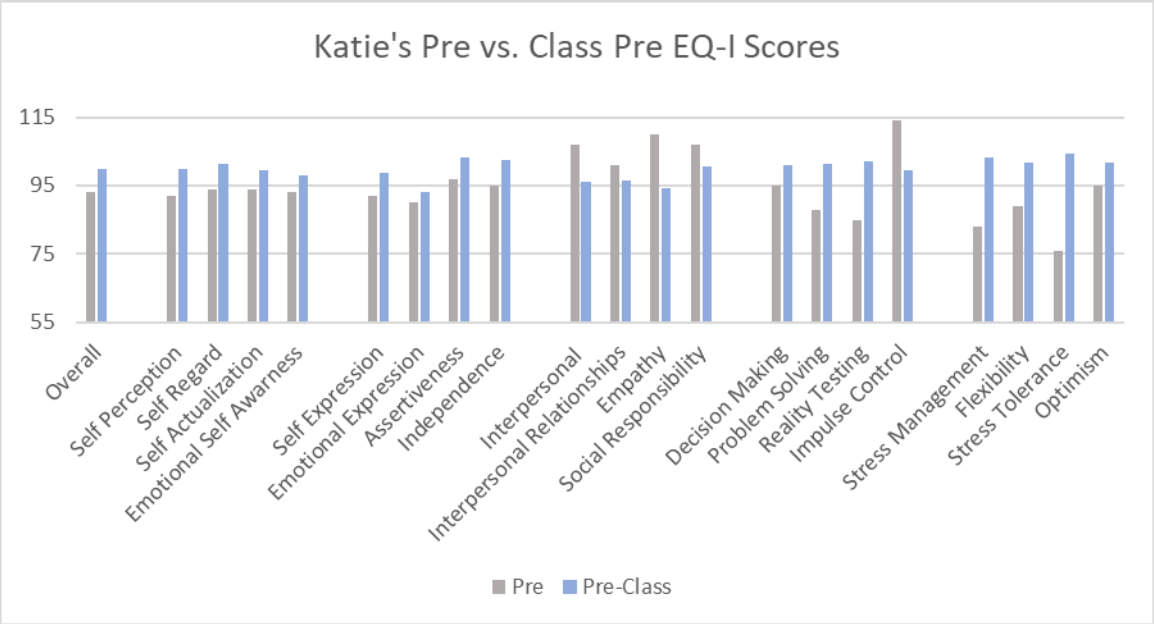

Figure 5.15 Comparing Katie's pre and the Class pre- EQ-i 2.0 scores.

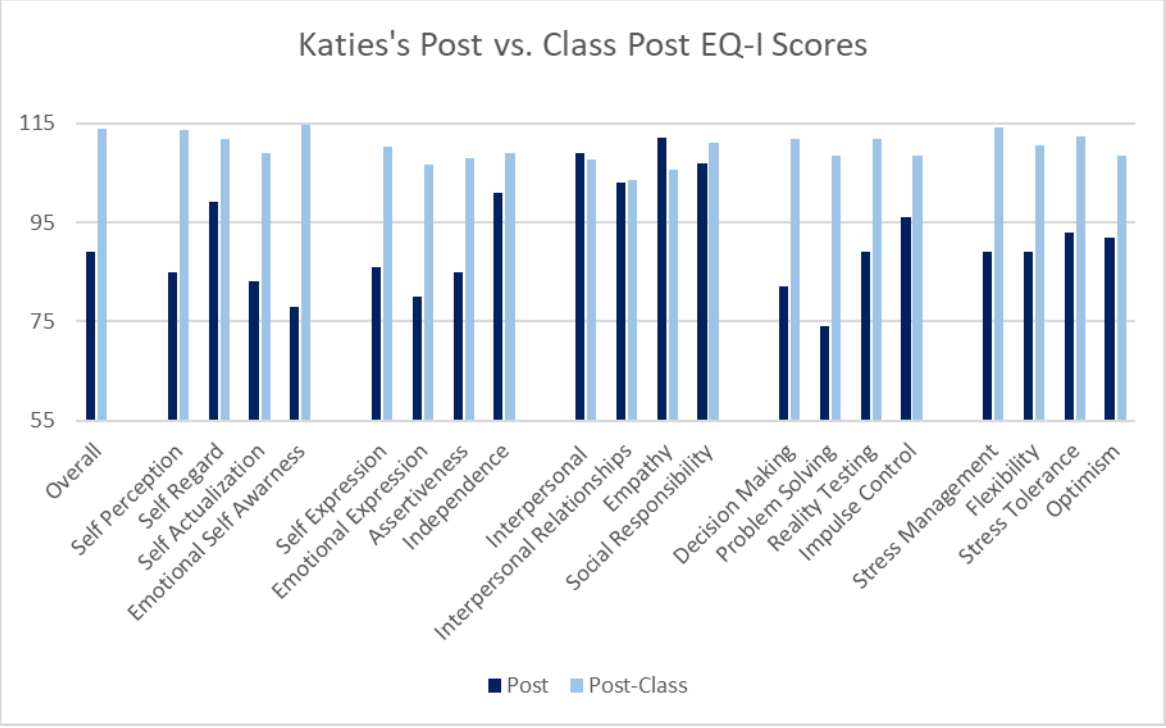

Figure 5.16 Comparing Katie's post and the Class post-EQ-i 2.0 scores.

In reflecting back on her journey into the field of engineering, Katie enjoyed doing the math and sciences in high school, and after seeing her older sibling do the business route in accounting and hating her work at one of the Big 4 firms, she looked for other possibilities. She was between "engineering or chemistry," but her dad was an engineer, so she decided to go that route. As with all students, she had to enter as a general engineering major and then "apply" for her concentration later. She initially hoped to go for chemical engineering, but she ended up "failing one of the math courses, so I got pushed back to apply...that didn't hinder me too much because I had a lot of basic courses that I had to take." Her friends that did move into chemical engineering started to share with her that "they really disliked it and that the people in it were mean….it's not like what we thought it was, the course and like the topics...so then, I rethought about it, but still, I put it on my application." She did not get into chemical engineering but was given two others choices by the University. So after "researching and talking to my parents and friends, I chose the one I am in because I wanted to do something in my life that was like more hands-on…"

In reflecting back on her struggles in the math class, she stated that she always had her "dad pushing me to study...then I didn't have someone pushing me, and I slacked off a lot...I need people pushing me." Taking this engineering leadership course has helped her a lot with developing her own "confidence" instead of relying on someone pushing her. For example, she shared a story about her being an officer in an organization. "While I was the officer, I do not like revealing things about me, and I don't reach out to other people as much. After this class, I realized like it's important to

do that. And I feel like this semester I've made the most amount of new friends this semester. When I am in my classes, I just reached out to people around me, and whenever we have homework or projects, I now have people I can talk to, and they can be like, oh, this is how you do it. I feel like that has pushed me to do better cause like it makes me have more of a feeling of we're all in this together."

In going deeper and describing how this class impacted her relationships with others, Katie shares about her lab partner, a person she did not think she would get close to. It surprised her because they "revealed a lot of stories about each other, and I feel like, within just a semester, he's become a really close friend and like that something that doesn't really happen often to me. I don't get close to people that fast. After I decided to open up, or because I opened up, they opened up back, and he knows so much about me now." Her lab partner had told her, "you know too much about me."

When I, the researcher, asked her, "Why do you think we are afraid people know too much about us? She replied, "I think it's just the feeling of being afraid to be judged too much...but when you equally share stories, it's like you are both complicated." She went on to say that it was learning about and trying the "empathetic listening" part of the course that really shifted her relationships and "caused me to open up." In the past when someone would tell Katie a story, she would usually say "I can't relate, but I know you're going through so much" and try to offer a solution, but now "I don't even give a solution, we just share stories...but I think in the end we feel better about it."

When she was writing the reflection on empathic listening, she struggled to meet the page requirement, so she started thinking more deeply about it. She explained, "I

really didn't think I applied it until like I had to write it down and then I realized it applied very much to him [lab partner]...so I wrote about him and then I think that's when it made me realize I am like applying things I learned in the class." She went on to describe how when she was "on a team before this class I would just sit back and then whatever the team decides, I'll just do my part in it, but now I think I have good ideas...I'm going to voice them now and I'll give them my input, and I won't argue or try not to argue over people, but I'll definitely speak up...it made me more confident...and I feel like I can make good ideas and I can contribute."

At this point, I had to speak up and comment on my observations as I watched her grow this semester:

> "Your confidence is so evident in how you have grown this semester, and it's amazing to watch that and to see you find that...you were so engaging when you presented, and I thought to myself, she is going to be a leader..., your information was deep and you knew how to connect with the people that you were talking to...I can't wait to see where you are going to take life."

Katie responded how the "one thing that helped my presentation was that I was passionate about like how I changed and it wasn't something I just had to throw together last minute...it's like, I actually want to show that change." She continued on to say, "when I came into this class I was skeptical...this class is about me that like, it sounds kind of stupid...but then I think it has actually helped me quite a bit….I'm going to take more opportunities that come my way...I like having people be able to depend on me, and I like having a bunch of friends...my goals have changed drastically, I kind of want to be the president [of my club] next year or the year after."

When I followed up and asked her about her advice for someone just starting this class, she replied, “don’t think it is stupid. You might think it is when they say it is a class about you...don’t take that lightly that it is about you, it’s going to change you because you look at all the reflections from the beginning and you are like these kind of sound stupid, I don’t know how to write, but this is a class that will change you...if you were shy or unconfident in the beginning, I really think it would change you, and if you are super confident like boisterous, it’ll let you know to be aware of others and their feelings.” While Katie did not think the course impacted her academically, she felt it positively impacted her future professional life, but most importantly, she believed it had the most profound impact on her personal life.

5.4. Designing a Brasillia or Designing Your Best-Loved Self

Trying to create the perfect city by disconnecting all the components into silos that do not intersect, the architect of Brasilia instead created a place that forced the city dwellers to a place of deliberation through the lens of the desiderata. They could live in an area that prevented them from experiencing joy or choose a different path so they could live with the joy of an interconnected world where their needs and wants intersected. In designing for that interconnectedness in education, transversal skills that transcend the disciplines, allow the learners to bridge across all their parts to live as a whole. For Brown (2006) resilience comes through empathy, connection, power, and freedom. In looking at the transversal skills that might lead to resilience and sustainability, we consider how developing those skills help transcend the person across their experiences. As we connect the stories in this constellation or research project, we look across their stories for times

they were living disconnected in Brasilia, compared to times they had a glimpse of living wholly as their best-loved self.

5.4.1. Designing the Path to Power Through Self-Awareness

While this course was intended in theory at developing leadership skills the students need for the workforce, the students reflected on the impact of this class across personal, academic, and professional contexts. Creating the space in the course for reflection opened up what Dewey (1910) described as a continuous, active process of interrogating one's beliefs, experiences, and knowledge, including their foundations and implications. For many in the course, it was the reflection that allowed them to reframe how they would utilize their new insights across those different contexts instead of only applying them to their future professional career. Two students shared narratives that resonated with each other:

1. "The course has been life-changing for me, allowing me to evaluate decisions that I have made from the past."
2. "I re-evaluated decisions I made when I was younger, and I feel like I have the freedom to plan a different future."

In gaining awareness of themselves and having the ability to look back at past decisions through a different lens, they felt a certain power to change their future. This same idea intertwined with the four up-close students' narratives. David shared, "this class helped me to be aware of my thoughts and actions, and how mindfulness can go such a long way in developing my character and how I interact with others." When Katie reflected on the class, she shared that she was "passionate about how [she] changed." she shared how "when I came into this class I was skeptical…but then I think it has actually helped me quite a bit…I'm going to take more opportunities that come my

way…my goals have changed drastically. I kind of want to be the president [of my club] next year." It wasn't just the self-awareness that moved the students towards feelings of power, it was self-awareness that allowed them to design for actions that brought harmony between their awareness and their actions.

This need for that harmony through interconnection is highlighted in Emma's story when she shared how she is going to keep working on "hanging out socially" because she does not like to "talk with others because I feel like I'm very awkward and I just stand there and just hope we have a conversation." She went on to share, "I am not interested, or I don't care for parties…I guess engineers are mostly introverts, so we don't talk to each other…I guess I stick with leaving school at school, and just my life is just, I guess family." To help combat the loneliness, she purchased a dog but is still feeling like she must remain in a siloed life of school/friends, life/family, and self/dog. In understanding her emotions and feelings of loneliness, she felt some power in combating that with a dog, but that choice does not connect her with the other vital parts of her whole, her desire for the interconnection of friends and family. It is at the intersection and alignment of the three components of Jarvis' (2006) cycle for transforming a person, the thoughts (mind), the emotions (heart), and the actions (body) that one can find the power to be their best-loved self. It is at the siloed or misalignment of the three components that one can accept their present as their future and force themselves to live in Brasilia or one can embrace the present as a place of learning and claim the power of designing for a more satisfying life or the becoming of your best-loved self.

5.4.2. Designing the Path to Freedom Through Self-Agency

Hagman (2019) says, “every human being is ineluctably embedded in his or her environment, especially the social environment, and his or her existence, psychologically and physically, is inconceivable outside this context. At the same time, it is the environmental system that gives rise to the capacity for freedom and self-agency” (p.33). Self-agency is the recognition of self as the author of one’s own life (Mitchel,1997), but what Hagman suggests is that freedom to author your life emerges from the social contexts, the setting, and characters within the story you are writing. This contrasts with the popular individualistic view of freedom or self-agency as doing whatever I want without regard for the impact on the environmental systems we exist within. Think about how the architect authored the story of Brasilia without an awareness of the people that would exist in this environment; forcing a story on the people or writing a story for the future inhabitants that they did not want to be written.

Consider Emma’s journey to becoming an engineer and who she feels is writing her story. Emma’s interest was piqued during a bring your child to work day that she spent at an engineering firm with her dad. She loved the hands-on experiences as she flew a virtual airplane. For her, the possibilities of engineering seemed endless, and as she entered university, she hoped for “mechanical engineering” because for her, she “could do many things,” or the possibilities seemed endless. The University said no to that concentration and gave her what she thinks she possibly put as her second choice (not really knowing much about it), leaving her to describe what she wanted to do with

her degree with the words, “I have no clue, I don’t know.” The pen for writing her best-loved self-story was taken out of her hands. After doing an internship at a prestigious engineering firm where the hands-on experiences she loved seem far off in the distance, she began to reconsider what putting that pen back in her hand would entail. Would she live in Brasilia, a city designed by others that didn’t meet her needs and desires, or would she design her own city and write her own story? At the time of our last talk, she was dreaming of a transfer to a law enforcement agency in a few years (she wanted to keep her parents happy with her by staying in engineering for now), so she could “help people and make a difference.” When she was describing her future plans, I, the researcher, got my first glimpse of Emma accepting the freedom that she began to understand when she said, “usually you don’t think much about yourself…[but] when it comes down to it, I have something [to say about it].” Not only does she have something to say about herself, but she could also have the agency to write the story, not just contribute to the story. What if her environmental system supported her self-agency during her time in college? Would she be closer to helping others through her work with a federal law enforcement agency, allowing her to find her well-being as she lived her best-loved self story?

For David, he realized that an area of growth was emotional independence. His lack of emotional independence led him to rely “too heavily on other’s thoughts and actions and how it made me feel…it made sense, I probably care too much about what other people thought and let that change my peace of mind.” Katie was so used to relying on her “dad pushing me to study” that when her context changed, she didn’t

know how to write her own story without him there pushing her. In learning the skills of the course, she began to develop her own "confidence" and began pushing herself to create a community at school and create an environment with a "feeling of we're all in this together." She shifted from having someone else design how she would grow or build her city to designing a city with a community that allowed her to thrive. The freedom of self-agency comes from the "confidence that I can reflect on what I am feeling and doing. That I can accurately assess my environment, and most important, my relations to other people. That I possess the capabilities for successful adaptation; and that this awareness is fully integrated into the core of my self-experience. It is something that I take for granted. It is who I am" (Hagman, 2019, p. 34).

5.4.3. Designing the Path to Connection Through Psychological Safety

When Katie was sharing her experience with the class reflections and how she struggled to meet the page requirement, she started at a place of "I really didn't think I applied it until like I had to write it down." As she thought more deeply about it, "I wrote about him (lab partner), and then I think that's when it made me realize I am like applying things I learned in the class." In describing those transformations, she said, "when I was on a team before the class I would just sit back and then whatever the team decides, I'll just do my part in it, but now I think I have good ideas…I'm going to voice them now, and I'll give them my input, and I won't argue or try to argue over people, but I'll definitely speak up…it made me more confident…and I feel like I can make good ideas, and I can contribute." So many times, in literature we talk about creating psychological safety for teams in the workplace so that team members can speak up, but

in hearing Katie's story, it makes me wonder about how we create psychological safety within our own self. Without that inner safety, we might never get to a place of action or claiming our self-agency. When we don't feel safe to speak up and have voice because of our inner climate, imagine how that could lead to being stuck in the city of Brasilia without ever having the chance to live as your best-loved self.

Edmonson (1999, p. 354) coined the term team psychological safety as "a shared belief that the team is safe for interpersonal risk-taking," and I reimagine that as Katie forming a personal belief that she is safe for interpersonal risk-taking or what a lot of researchers call vulnerability. In her book, *Daring Greatly*, Brené Brown (2012) defined vulnerability as uncertainty, risk, and emotional exposure. In describing the definition of psychological safety, Edmondson (1999) claimed, "the term is meant to suggest neither a careless sense of permissiveness nor an unrelenting positive effect but rather a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up" (p. 354). For Katie, in practicing the skill of empathetic listening, she then developed in herself the sense of confidence or the capability to "open up" or "speak up" without the fear of "being afraid to be judged too much" by others.

In Brown's (2006) work on shame resilience, she found that when participants experienced an empathic response, "their sense of connection and power was often increased, restored and/or sometimes strengthened" (p. 47). For Katie, when she practiced the skill of empathic listening to others, she not only created a strengthened sense of connection with her lab partner but a strengthened internal power to be more fully her and reclaim her voice in team settings. In Katie's story we beautifully see that

as she internally shifted to a belief that she could partake in interpersonal risk-taking, while also allowing others to feel safe with taking that interpersonal risk with her within the social context, she experienced a place where she could cross boundaries between her reframed internal climate and external context. In crossing that boundary she designed for the "birthplace of love, belonging, joy, courage, empathy, and creativity" (Brown, 2012) or what I imagine as a place where Katie was learning to become her best-loved self.

Before someone can decide if Brasilia should be part of their story, they must create an internal environment that feels safe to "open up" and explore what may or may not end up in their personally authored best-loved self story. We see that bubble up in Samuel's story as he describes his relationship with his mother and brother and how "they want things done their way, and they don't care what other people think." As he gained awareness into the fact that he is "an avoider….I don't try to solve things; I just take a beating," he was able to begin developing that internal self-confidence needed to speak up, allowing him to "be less of an avoider and actually try to fix and resolve things." He is better able to communicate with his mom and brother, and he feels he can "get [the] point across," and for him, this made things "better…and more satisfying." If anyone had been able to speak up to the architect of Brasilia, they might have been able to shift the interactions and influence the design of the environmental systems to be more satisfying, but when we fail to embrace the freedom of "speaking up" we run the chance of limiting the possibility of connection.

5.4.4. Designing the Path to Empathy Through Self-Compassion

Self-compassion is "an adaptive way of relating to the self when considering personal inadequacies or difficult life circumstances" (K. D. Neff & McGehee, 2010, p. 225). When you are compassionate, you are willing to embrace other's weaknesses and shortcomings without giving judgment. Where self-esteem is an unstable construct because it is influenced by the external and can lead to problematic behaviors such as bullying and narcissism, self-compassion is a stable construct because it requires no external validation of one's worth and leads to resilience (Neff, 2010). Neff (2003) finds there to be three major components of self-compassion:

1. Self-kindness: treat oneself with care and understanding instead of judgment
2. Sense of common humanity: imperfection is a shared aspect of humanity and not an indication of one's failures
3. Mindfulness: holding one's present moment in a balanced perspective, aware of painful thoughts and emotions, but not absorbed by them

If one is high in self-compassion, they could be equally kind to others as they are to themselves. In contrast, if they are low in self-compassion, they might be kind to others, but not to themselves, so they both could be equally empathic, but it might lead to differing long-term outcomes (Neff, 2003; Wei et al., 2011). Those low in self-compassion but high in empathy could lead to empathic distress, fatigue, or burnout. In looking back at Katie's EQ-i 2.0 scores and her story, we see that her empathy was much higher than her self-perception. When asked to reflect on "why do you think we are afraid people know too much about us," she replied, "I think it's just the feeling of being afraid to be judged too much...but when you equally share [devastating] stories,

it's like you are both complicated." In practicing empathic listening, she ended up coming to understand that imperfection is a shared aspect of humanity. She went on to say, "I don't even give a solution. We just share stories…but in the end, we feel better about it."

For Emma, she has a similar struggle with being judged, specifically by her mother. She shared, "I'm afraid she [mom] is going to judge me…she doesn't have a filter. She just says what she wants to say…like I ordered a ring...my Grandma came over, and I was excited telling her about it, and then my mom says out loud, 'honestly, I think it's ugly.'" Emma thought, "Oh, thanks, mom." She went on to reflect that "if she [her mom] could keep her mouth quiet, I would feel, I don't know, a little bit easier to communicate."

Emma's fear of being judged comes from her childhood. While she did not share these experiences in our interviews, she did share them in her written reflections. Her reflections were filled with thoughts, actions, and raw, raw emotions. She explained how being "left as a baby and then being left by my caretakers at six years…somewhere deep inside of me, I recognize the pain of being left out…[I know] what it is like to be not good enough." She went on to share, "to make sure that I did not get left again; I made sure to be the perfect child and do as I was told and make my parents proud." As she continued to reflect, she shared, "I know I am loved, but I am still not able to learn that I do not need to prove my worth to others. What I have learned is that I still need to be the perfect child and to do everything I can to feel like I have a place. It makes me

feel like I have a purpose and something to accomplish…I will not allow myself to cry because others have it worse than I do…I work harder and try not to fail again."

As I read her reflections, I cried and learned a little more why this journey of supporting students in designing their best-loved self is so important, but also I couldn't help but hope she finds the path to self-compassion, so she can discover the path to well-being or truly living as her best-loved self.

5.5. Final Reflections and a Wish Forward

We started with knowing through self-awareness and then moved outward to doing with self-agency and then back inward with creating an internal climate that feels safe. We ended at a place of being, being compassionate to self and compassionate to others, so you have the chance of writing the story, or designing the city for becoming your best-loved self. Transformational education must go beyond the learning of knowledge and involve the development of self, but only through the lens that learning is both collective and individual, for we are always part of a social context. As we juxtapose the internal and external components of power (self-awareness and awareness of others) and freedom (self-agency and agency for others) with connection (self-vulnerability and vulnerability with others) and empathy (self-compassion and compassion for others), we begin to create the conditions for individuals to be resilient and communities to be sustainable through the designing of our best-loved self stories. Just as Schwab (2004) distinguishes between 'manifest' and 'true purpose' of activities, with 'manifest' aligning with developing the best technical skills and 'true purpose' aligning with developing the capacity for change in their transversal skills (Ben-Peretz &

Craig, 2018), it's the latter that creates the space for "rehearsing the future" (Knitter, 2006, p.1). While formal classroom learning or design-based learning experiences might develop the technical skills, it's through the lens of 'true purpose' that the shift towards developing transversal skills can provide the bridge to a learner becoming their 'best-loved self.'

6. METAPHORS OF KNOWING, DOING, BEING, AND BECOMING THE BEST-LOVED TEAM: REMOVING THE ROSE-COLORED LENS OF THE 'TEAM AS FAMILY' METAPHOR

In Craig's (2017) article, Metaphors of Knowing, Doing and Being: Capturing Experience in Teaching and Teacher Education, she begins with the Lakoff & Johnson (1980) quote:

> Metaphors…create realities…A metaphor may thus be a guide for future action. Such action will, of course, fit the metaphor. This will, in turn, reinforce the power of the metaphor to make experience coherent. (p.156)

The 'team as family' metaphor is often used to elicit warm, fuzzy feelings; it is a way to create this rose-colored or optimistic lens of the bonds on a team. This rose-colored lens aligns with a description one of the research participants shared about how her work environment had changed to a pair of recently re-hired employees:

One of the first things I did was say, "Welcome Home." The second was to explain to them that the atmosphere had changed since they had been gone and that it should feel more like a home and family with a strong bond and to let me know how they felt after being back for a while. It warmed my heart to hear that they felt the change in the environment and the vibe in the team, and it was making it a much better place to work.

A few months after describing her work environment as a home and a family, that same participant was let go and was out looking for a new job; that family was no longer a part of her present story, except in the context of being part of her past experience. Does getting fired align with the 'team as family' metaphor, or does that rose-colored lens of the metaphor prevent us from fully understanding what a 'team as

family' metaphor looks like in reality within the organizational context? This research journey sets out to explore how placing a course focused on understanding how to develop emotionally intelligent teams in parallel with a project-based technical course in an engineering management master's program provided a different pedagogical approach for helping engineering students develop the transversal skills needed to work and/or lead effectively on teams. As the research journey unfolded, a more intimate view of the 'team as family' metaphor bubbled to the surface. Throughout the rest of this chapter, we will wander through the 'family-related' metaphors that emerged as the participants reflected on their past and present experiences of knowing, doing, being and becoming the best-loved team: the babysitter, the grizzly bear (disciplinarian), the table of belonging, and a family with an addict.

6.1. Literature Review

The literature that builds the foundation of this study includes leading teams, transversal skills, team emotional intelligence, design-based learning experiences, and metaphors.

6.1.1. Leading Teams and Transversal Skills

Kozlowski and Bell (2003) define work teams as (a) composed of two or more individuals, (b) who exist to perform organizationally relevant tasks, (c) share one or more common goals, (d) interact socially, (e) exhibit task interdependencies, (f) maintain and manage boundaries, and (g) are embedded in an organizational context that sets boundaries and constraints the team. As the needs of industry have shifted to include work at a team level, more employees are finding themselves embedded within a team

context and dependent on their coworkers to complete their work tasks. As individuals work in teams, they experience different workplace emotions, and research has shown their performance can be incongruous when working at the team level (Kaur et al., 2016). How a team manages these emotions to support the quality of the social interactions on the team, will influence the collaboration and overall effectiveness of the team (Druskat & Wolff, 2001; Lopes et al., 2004). First, trying a flat organization, Google realized the benefit of having managers or leaders for the teams across the organization. Based on their internal research, originally known as Project Oxygen (2008), Google has iterated on their results and data collection and found ten behaviors of Google's best managers (see Figure 1)

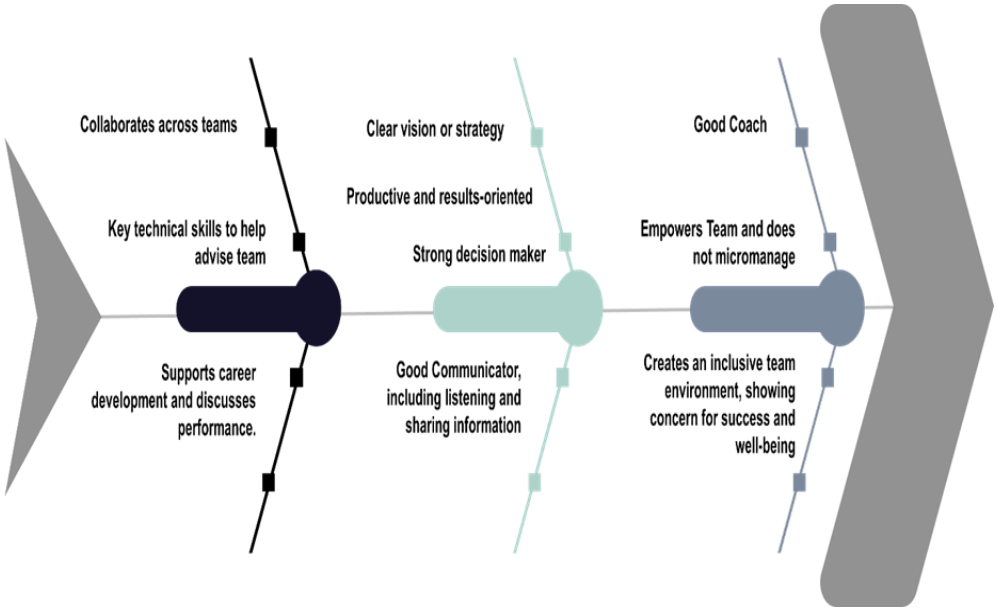

Figure 6.1 Ten behaviors of Google's best managers from Project Oxygen.

As seen in Google's findings, the leader needs both technical and non-technical skills to impact the behaviors and emotions of the team environment positively. In 2015,

the American Association of Engineering Societies (AAES) and the U.S. Department of Labor (USDOL) collaborated to create an Engineering Competency Model that outlines the core competencies of engineering professionals and embedded within their model were both technical and non-technical competencies. Included in that model were the identified critical non-technical or transversal skills for leaders or managers in the engineering field, such as delegating, supporting others, motivating and inspiring others, managing conflict, and team building.

To avoid the gray space of what a non-technical skill is, the term transversal skills will be used throughout this chapter, and it will be defined as skills that can transcend contexts. Moving past skills that are job, task or academic discipline-specific to the transversal skills, such as motivating others and managing conflict, are needed to both lead an effective team or be a member of an effective team, so the team can be productive and meet the intended outcomes (L. Prati et al., 2003). Inherent within many of the transversal skills needed to work on teams (motivating, managing conflict) is dealing with and supporting the creation of the emotional context of the team. Within a team, each interaction between and among team members produces emotions (Kemper, 2000), so as leaders are developed to lead effective teams, attention needs to include how to develop emotionally intelligent teams.

6.1.2. Team Emotional Intelligence

Most research studies on emotional intelligence have centered around the individual level, but some researchers have begun to look at emotional intelligence at the team level (Druskat & Wolff, 2001; Jordan & Lawrence, 2009). Druskat and Wolff

(2001) define team emotional intelligence as "the ability of a group to develop a set of norms that manage emotional processes" (p.133). Druskat & Wolff's (2001) research finds three essential components for team effectiveness, all of which move beyond solely existing in the mind and include emotional ways of knowing:

1. Trust among team members
2. Sense of group identity: a feeling among members that they belong to a unique and worthwhile group
3. Sense of group efficacy: the belief that the team can perform well and that group members are more effective working together than apart

To obtain team emotional intelligence, you must go beyond each individual member's emotional intelligence and create a team climate that supports the building of the emotional capacity of the team to respond constructively in emotionally uncomfortable situations and then constructively influence the emotional direction of the team (Druskat & Wolff, 2001). Druskat and Wolff (2001) state team emotional intelligence is "about the small acts that make a big difference…it is not about harmony, lack of tension, and all members liking each other; it is about acknowledging when harmony is false, tension is unexpressed, and treating others with respect" (p. 86). Team emotional intelligence emerges from the behaviors and the norms of the team that guide those interactions.

For teams to be effective, Druskat & Wolff's (2001) theory on team emotional intelligence (see Figure 2) starts with the team fundamentals (basic operating processes) that create the underlying conditions for a team to perform. Then a team needs to set team emotional intelligence norms that guide the interactions among team members, team unit, and stakeholders outside of the team. The third level shows how a team that

is interacting based upon the Team EI norms could produce team social capital, which refers to the value-added by the supportive and trusting relationships within the team. Druskat and Wolff find the social capital that emerges is psychological safety, team identity, and constructive dialogue, which all impact the level of team performance.

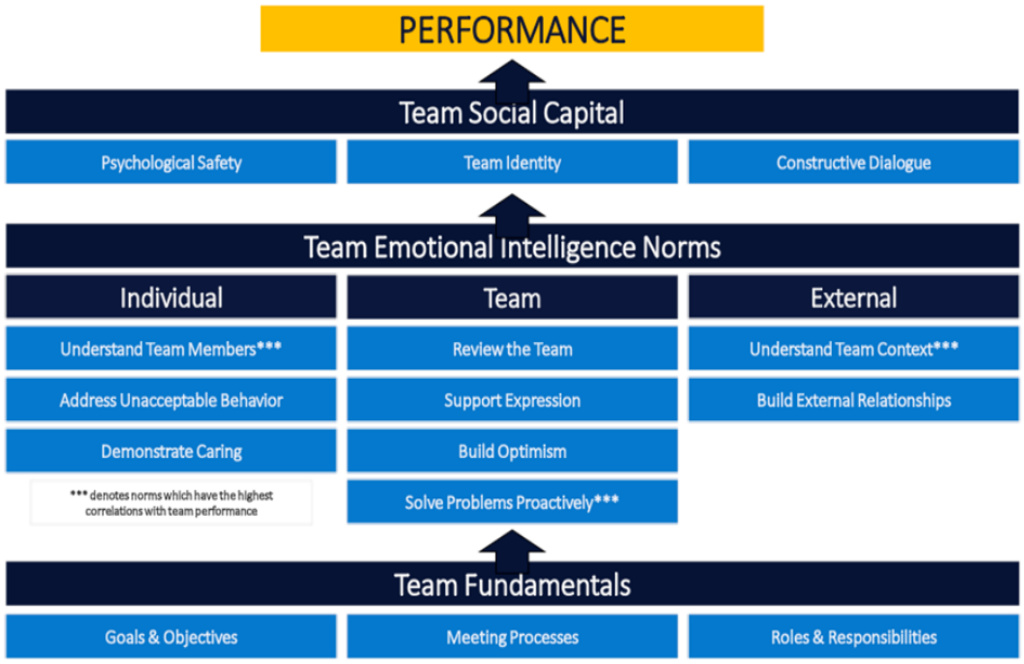

Figure 6.2 Druskat and Wolff's (2017) model for team emotional intelligence. Reprinted with permission from "Team Performance Essentials Model" by Druskat, V. and Wolff, S., 2017. GEI Partners, Copyright [2017].

Based upon their research on team emotional intelligence, Druskat and Wolff developed a Team EI survey (GEI Partners, 2017) that was utilized as a part of the participants' experience within this study. The survey was given as a reflective tool for the participants to explore more deeply the team dynamics and transversal skills needed to effectively lead teams and to connect their experiences with design-based learning experiences and transversal skills.

6.1.3. Transversal Skills in Design-Based Learning Experiences

Design-based learning (DBL) experiences can be defined as problem-based team learning experiences where learners utilize the processes of inquiry and reasoning and build knowledge-in-action through interactions and iterations as they move towards designing innovative artifacts, systems, and solutions (Fortus et al., 2004; Gómez Puente et al., 2011; S. Smith, 2018). Design-based learning experiences should be real-life or authentic, team-based and collaborative, allow for the utilization of professional skills alongside domain knowledge skills, and allow for an iterative design process as you move towards the final product (Bekker et al., 2015; Doppelt et al., 2008; Gómez Puente et al., 2011, 2013, 2015). Due to the inherent characteristics of DBL experiences, they have been highlighted as a possible way of developing transversal skills in students. (Kamaruddin et al., 2012; Phusavat et al., 2019; Sanchez-Martin et al., 2017). For this study, the design-based learning experiences were utilized to develop the technical skills in one class, while simultaneously giving them a real-time team experience to reflect upon the transversal skills needed to lead effective teams. It was through this lived experience that the metaphors began to emerge.

6.2. Metaphors

According to Nisbet (1969) metaphors are an indispensable way of knowing throughout the history of human consciousness. Metaphors allow us to "name" a situation, they "frame" it, and they "set the problem" (Schon, 1979) by creating a way of knowing that originated from the embodied experience of individuals (Craig et al., 2017). In Lakoff and Johnson's (1980) theory of embodied cognition, they explore how

we think in frames of mental structures to make sense of our world, we use one conceptual or experiential domain to create other mental structures, our conceptual structures arise from the embodiment of our subjective experiences, and we often fail to recognize the frames or metaphors that are shaping our understanding or reasoning of a particular phenomenon. In eliciting the metaphors embedded within our cognition, we gain insight into how we are making "sense of our experiences by uniting our reason with our imagination" (Batten, 2012, p. 17). Batten (2012) declares that "because metaphors, both conventional and new, are forms of comparison and therefore highlight one particular aspect of a concept, they hide other dimensions of it, especially those that are inconsistent with the metaphor" (p.17). In thinking about the 'team as family' metaphor with the rose-colored lens, there are dimensions of a family that are often hidden because of the inconsistency with the solely optimistic view of a 'team as family.'

6.2.1. Team Metaphors

Since teams are complex, ambiguous, and often unpredictable, metaphors could provide effective ways of understanding the intricacies of team dynamics and the shared understanding and sensemaking that is shaping the behaviors of the members of the team. In a study done by Gibson and Zellmer-Bruhn (2002), the researcher looked across the metaphors that have emerged to describe a team and has found the reference to those mental images include three components: who is on the team (roles) what the team does (scope), and why the team exists (objective). Gibson and Zellmer-Bruhn

explored how the five most common metaphors for teams (sports, military, family, community, and associates) shed light into those three components (see Figure 2).

Teamwork Metaphor	Likely to Result in Expectations Such As . . .		
	Roles	Scope	Objectives
Sports	Explicit roles such as coach and players with positions, but a relatively flat hierarchy	Often limited to physical and social activity; sometimes also includes psychological domain	Clear and salient with outcomes such as win, lose, goals, scores, tallies, and statistics
Military	Hierarchical roles such as commander, second in charge, and soldiers, each with indisputable rank	Typically limited to professional, physical, and educational activities	Extremely clear and salient with outcomes such as survival, life, death, de feat, occupation, or conquer
Family	Hierarchical roles such as mother, father, brother and sister each with varying levels of paternalistic authority	Very broad scope with activity covering a number of domains in life (e.g., private, psychological, physiological, physical, social, entertainment, educational, professional)	Typically non-existent, ambiguous, or inherent (e.g., "to get along" to "feed and cloth")
Community	Informal, ambiguous, and shared roles	Broad scope with activity including numerous domains in life (e.g., psychological, social, entertainment, educational, professional)	Ambiguous and non-task oriented (e.g., to provide a safe environment or sense of support)
Associates	Little identification of roles	Typically limited to professional activity	Sometimes explicit, but evolving, and less task oriented (e.g., to share the work load, provide back up, socialize)

Figure 6.3 Expectations of various Team Metaphors.
Reprinted with permission from "Minding Your Metaphors: Applying the Concepts of Teamwork Metaphors to the Management of Teams in Multicultural Contexts" by Gibson, C. and Zellmer, M., 2002. *Organizational Dynamics*, *31*(2), 107, Copyright [2012].

By utilizing the 'team as family' metaphor as a lens into roles, scopes, and objectives, it is constraining the metaphor at the team fundamentals level within the team emotional intelligence framework, but as participants in this study reflected through the

lens of the emotions of teams, a different perspective of the 'team as family' metaphor emerged.

6.3. Narrative Inquiry as Method and Methodology

As I engaged on this journey with my participants, adopting a fluid and relational research method, narrative inquiry, allowed the research to "unfold in response to phenomena encountered in the field as opposed to being driven by predetermined research principles" (Craig, 2012). Narrative inquiry also allows the experience from the perspective of the participants to take center stage (Clandinin & Connelly, 1986) as it helps to uncover the intention behind the human action and the knowledge that comes from the contextual experience (Lyons & LaBoskey, 2002). Since the participants' perspective, the intention behind their behavior, and the knowledge gained from the situated experience are central to this research study, narrative inquiry is employed as both the method and methodology for this study. Field texts (data) for this study include observation notes from the weekly team meetings, interview notes and transcripts, written communication amongst the team (messenger, text, email, Basecamp), class assignments and reflections, and the team emotional intelligence survey. The field texts are used to "discover and construct meaning" (Clandinin & Connelly, 1994, p.423), and in this case, the field texts were used to lift the shared metaphors utilized as a frame to story and re-story the research text (Clandinin & Connelly, 2000). Broadening (Connelly & Clandinin, 1990) was used to situate the metaphors and experiences within the nine team EI norms from Druskat and Wolff's assessment: (1) understand team members, (2) address unacceptable behavior, (3) demonstrate caring, (4) review the

team, (5) support expression, (6) build optimism, (7) solve problems proactively, (8) understand team context, (9) build external relationships. Burrowing (Connelly & Clandinin, 1990) was used to elicit resonance across the narrative exemplars of experience through the lens of the metaphor. The last narrative inquiry research tool utilized was fictionalization (Clandinin et al. 2006) to ensure the participants in this study are anonymous.

6.3.1. Research Context

With many engineering master's degree programs focused solely on the technical skill development and Master of Business Administration focused more on business skills development and leadership development, there appears to be a lack of engineering-focused graduate education programs that provide pathways to prepare sustainable technical leaders in the field of engineering. The Master of Engineering Technical Management degree at a tier 1 research university in Texas seeks to address this gap by integrating business management, engineering, and leadership within their program. After surveying and interviewing industry experts, a critical need was identified for a program that creates a unique blend of the industry-critical skills for managing people, projects, and profitability (Zoghi, Nagarathnam & Leon, 2017). Understanding that leadership begins with awareness of self and awareness of others, the program deliberately focuses on the development of emotionally intelligent leaders. To start the 21-month program, students engage in a weeklong residency class on personal leadership, emotional intelligence, personal coaching, and that work continues into the second year where they work on team emotional intelligence and team coaching. The

participants in this study were enrolled in a team leadership coaching class that is focused on both developing team emotional intelligence and leading emotionally intelligent teams. Some key learning objectives for the course were:

- Assessing your emotional intelligence for greater effectiveness in a team environment
- Learning how to improve the emotional intelligence of teams
- Learning to work with the three levels of emotions at the individual, team, and cross-boundary levels
- Identifying areas for improvement for you as a team member

As part of the technical class, participants needed to complete two project-based or design-based learning experiences. For the team leadership coaching course, participants reflected on how they were developing their personal emotional intelligence, team emotional intelligence, and learning to more effectively lead emotionally intelligence teams as they journeyed through the 'lived experience' of those design-based learning projects. There were eight participants divided amongst two intact teams, as well as two additional participants that shared thoughts about their team experiences in the class and reflected on past team experiences as they journeyed towards learning to lead more effective teams. Unique about these students is that they cross boundaries between student teams and work teams daily. They are working professionals, and many of them have leadership roles within their organization, so as they reflected on their experiences with teams, they threaded their sense-making between what they were experiencing in the class with their experience in their organizational context. In the next section, the metaphors that emerged across the data sources will be shared, followed by other participant narratives that the researcher lifted from the field text because the story resonated with metaphor.

6.4. Narratives of Experience

This next section wanders through four metaphors related to the 'team as family.' The metaphors include, the babysitter, the grizzly bear, the table, and the family with an addict.

6.4.1. Metaphor 1: The Babysitter

> *Everybody's in this 100% to do the best job we possibly can. There's no forcing anybody or holding anybody to the fire to complete their job. I don't have to babysit a single person. It's amazing. I don't have to babysit anybody…the worst team I probably have ever worked on…it was awful…it had all those things…we babysat them all week [keeping them on track, looking over their work, redoing their work].*

6.4.1.1. Burrowing Reflection

Across the narratives of experiences shared during this research journey, the participants brought forth times when they felt like they had to micromanage or babysit a team member (within this study and other past experiences), as well as stories of feeling like they were being micromanaged or babysat leaving them feeling constrained and frustrated. As one person reflected on their behaviors on a team, they admitted that out of their frustration they accepted the role of a babysitter as they described how,

> My biggest shortfall was getting the most effort out of every team member. I think to do things for the group or stepping up early allowed for others to do a bit less. We all have stressful lives and I took too much on my plate this semester and all things suffered…I can get upset when things are not progressing, and I am tired and stressed. I need to realize this and take a breath forward. A few instances I allowed raw emotions to pour out and they may have been direct and hard for the team to take. This may have held back our true potential.

At another point in the research journey, this same participant reflected on how it is hard to call someone out for not pulling their weight if they are of equal rank to you. Interestingly they suggested the approach they would need to use might be coaching, as compared to if they were higher in the hierarchy, they would be more directive. They went on to share how "as a peer, it's very difficult. Leverage isn't really on your side. I would love to know where you could find that leverage."

In addition to those stories, other counter stories (Craig et al., 2018) emerged. One counter-story that emerged was from a participant who described taking advantage of the fact that someone on the team would take the role of the babysitter and take care of what needed to get done. They shared,

> You know there was times that you know, I would probably because I knew something else was going to get done by someone else, I just kind of, you know, hey, they're going to take care of it…[I probably should have] stepped up a little bit more and…offer[ed] more help.

Another counter-story that emerged was the person who felt like they should be babysitting the team and taking on more work, but they found themselves in a context where everyone was doing what they are supposed to do, leaving them feeling uneasy. Expecting to be in the same team plotlines of their past where they had to pick up the slack or take care of others, they felt uncomfortable and began to question their worth on the team. One participant shared,

> I got my two interviews done pretty fast, and as first, I was like I wasn't doing as much, maybe because Mason knocked out like four of them…I wasn't going to do double just because I felt like I didn't have enough…I kind of felt like I wasn't doing what I was supposed to be doing…we all made assignments (tasks) on who would do what and my parts were shorter than I think I expected them to be but they never felt like it was [enough]…they still put the slides together…and

> all that, but they never batted an eye like I wasn't doing enough. I'm sure it was fine, it just felt like that to me.

A third counter-story that emerged was the team that still jumped in, picked up the slack, and did work for other team members, but it was out of support, not the need to control. It often left the participants with that same uncomfortable feeling, but it was coupled with gratitude for the support their team was expressing. One participant shared,

> I was very happy that everyone was willing to jump in and help, but that felt like I probably needed to do more…I was only gone for a week, but I still felt that I was letting them down because they were having to do extra work for me.

Another participant described it through the lens of compassion:

> I think compassion was real, I mean, cause each one of us had either a serious illness with a family member or a death or with me the trials of the whole job environment being upset…no one took advantage of anyone. I don't think anyone felt like "all mad [that we had to] pull your weight as well," which I have seen a lot in a lot of different group settings.

While all stories adhere to the loose definition of a babysitter as someone who picks up the work for another person or takes care of someone who is not able to take care of themselves, it was through different contexts and emotionally charged lenses that those behaviors were evaluated to be" babysitting" or as the act of a compassionate team member.

6.4.1.2. Broadening Reflection

Throughout the stories of the team member acting as a babysitter out of perceived necessity and those with experience of a team member babysitting them (when they didn't want to be babysat), we could hear tones of frustration and resentment. Those doing the babysitting were failing to address unhelpful behaviors (Norm 2) of

team members that they felt were forcing them to enact the babysitter role. The one participant that struggled with finding the leverage to address unhelpful behaviors feels a very different power dynamic is needed than a team that would be enacting the norm of addressing unhelpful behaviors through the lens of team emotional intelligence. Creating a power dynamic to address unhelpful behaviors nor avoiding addressing the unhelpful behaviors would lead to the type of emotional climate needed for learning and performance.

This contrasts with the reflections where picking up the slack of a teammate was not seen through the lens of needing to address unhelpful behaviors, but instead was a way to demonstrate caring to the team members (Norm 3). By engaging in those behaviors through the lens of compassion, the team created a safe place for the team to admit when they needed support and a safe place where the work did not have to be equal at all times, which in turn led to a group that develops a team identity and their confidence in the team's ability to perform. While not doing your part of work on the team could be part of a context where the behavior needs to be addressed, it also could be part of the context of a team demonstrating care because of your personal lived stories colliding with your work milieu. It is through understanding the team members (Norm 1), constructive dialogue (Norm 4), and enabling members to more easily express their honest needs and feelings (Norm 5), that a team can accurately assess the situation and handle it in a way that leads to team effectiveness and not in a way that leaves to disconnection amongst team members.

6.4.2. Metaphor 2: The Grizzly Bear

> *When you sit down with him at lunch, and you ask him a question, and he locks those eyes on you, and he asks you a question back, you're like, 'Oh Hell.' I just became the prey. He's that grizzly bear, and now he's looking right at you. It's like, Oh, you don't want to sit there and start joking with him, because it's like, I don't know what he's going to do….that was me. I was really insecure.*

6.4.2.1. Burrowing Reflection

The fear of judgment and the resulting consequences of that grizzly bear leads to a place of insecurity and almost paralysis of action. As participants discussed feedback, at times, they viewed it through this grizzly bear lens of judgment instead of through a lens of revision. In thinking of parents and their role as disciplinarians, some discipline through judgment and consequences and some approach shifting the same behavior through a place of learning and growth. If we embraced the growth lens, then would we see the same behaviors of judgment as feedback for growth, and then would there be a need for consequences outside the natural ones that occur? One of the participants describes the place of revision and growth:

> I think anything we can do to foster a revision ethic…in academia, and in the workplace, it would be huge. So, I'm all for, hey, guess what? If you want to you got a C on this project. If you want to rewrite it, you have a week you can resubmit, and you can bring it up to an A. If you want, and here's what I need. I'd let them redo it…because you're teaching a revision ethic which is essential to doing your best work…we can't be just evaluative…it does not give us a chance to learn.

In looking across the narratives, one feeling that came up as the participants discussed delivering and getting feedback was guilt.

For one participant, he shared about striking a balance between negative and positive feedback, as well as coming to a place of acceptance that not everybody is as good as the next at their job.

> It's funny because today, I actually had to do something I hadn't done in a while. I had to write up, the guy that works for me, I had to write an award for him, and I hadn't done that in forever. It's probably since I was in the military, but…for the most part, when you're writing performance appraisals or giving feedback on people, you always try to semi-balance good comments with bad comments or something like that. You don't want to just put complete bad on everything, but at the same time, you got to be honest, especially when you're evaluating everybody as a group. Some people are not as good at their job as other people.

In adopting a belief that not everyone deserves the same score, he was willing to score himself and teammates less than the team member that carried most of the load on the project. He was attempting to support that team member in giving 'fair' scores. He described that difficult conversation as a

> Gnashing of teeth at the end when we started talking about who was getting graded for what, and I think that's where Louis kind of gave up to get along, and it went to where he just finally was like, "fine. We'll just…everybody gets a four."

Another participant described the feelings of guilt that she was responsible for the feedback or the grade because she was the last set of eyes on the project, even though the team collectively created the artifact.

> And this wasn't frustration with my team, it was me on a team, if we got a low grade, there's a part of me that's going, 'do I…you all aren't blaming me. Right? I feel like I did what I could with what I had.

The third story of guilt emerged as one of the participants discussed the emotional struggle with editing someone else's writing. Within this design-based

project, one of the deliverables was a written report. She describes this struggle and how it impacted her behavior.

> So, the draft that I was given didn't…he put a whole bunch in there, so that was good. I mean he did a ton of work, but his writing was very bed-to-bed…that's the term that we use where it's just, he did this, and he talked, and that person said, so it didn't weave the things in and out, but I didn't…so all I did was take…I cleaned up around the edges, but I didn't want to edit somebody else's writing too much.

As others reflected on feedback, they admitted the emotional sting, but they also filtered it as a learning experience that provided them a path to being at their best.

One participant shared,

> Just take criticism or feedback. As for what it is, you know, learn to appreciate feedback and not think it's a personal attack because it's not most of the time. Um, yeah. So, basically, I just tell her to not internalize all the feedback, just, you know, listen to it with an open mind and, learn from it because that's what the point of feedback is, not all feedback is going to make you feel warm and fuzzy, some feedback is going to be painful.

Another discussed how he had shifted his past view of feedback and tried to support his team in changing from seeing it as a judgment on their ability and as a pathway to growth. He described that experience,

> I was trying to talk her off the ledge…at the very beginning when she was very upset about the grading. A year ago, I just would've jumped right on that bandwagon and started agreeing with her and making it worse, instead of being aware and trying to be a different perspective of, we can use this to better ourselves for the next one. So, I bring an awareness, I'm definitely not an expert by any stretch of the imagination, but it's something that I'm always conscious of.

A third participant acknowledged the disappointment, but used it to motivate himself and the team to do better on the next iteration:

> I was disappointed with the grade we received for the first team project, but we have taken the feedback we received, and we are trying to go above and beyond for the next project. It has been great to see that no one had to push the others to work harder on this project than before. We were all in sync from the start that we would do what we can to learn from our mistakes and be better.

While the three stories above approached the feedback as a learning experience, a third view of feedback emerged where the participant enjoys a team where seeking out feedback on ideas that are not even fully developed is embraced and how that brings about a sense of freedom and excitement.

> I love getting together and brainstorming wild to crazy ideas and knowing that you don't have to act on them all, but just having someone to bounce ideas off and then have him go, 'yeah, but maybe this wouldn't work because of this'…and then pull back and redirect, but to not have conversations shut down before you explore…and I love it if there's freedom to bring half-baked ideas…and it's ok if there are no half-baked ideas and it's a today we're sticking on this topic…that's fine too, but as long as there's some place for them.

6.4.2.2. Broadening Reflection

When feedback is seen as judgment and punitive, it often instills feelings of fear, guilt, and anxiety. In the narratives of experience, when the feedback was seen as coming from a place of revision or learning or as something worth seeking out during the learning process, it brought about feelings of determination and excitement as it fostered a healthy strive towards the team performing at its best. When feedback is viewed from this grizzly bear lens of fear and failure, there was a struggle to address unhelpful behavior (Norm 2) because it was almost admitting defeat. The team only wanted to review the team (Norm 4) from a positive lens. This was extremely evident in their decision to give everyone a four, whether it was deserved or not, and in how they gave feedback on the Team EI assessments as they journeyed through the class. One

participant called that out and said, “I learned that a leader will get a more honest answer about group dynamics if they interview members one on one rather than in a group or group survey. After the first survey, team members quickly realized that each could identify who left specific comments, and once they learned that, most of the second survey answers became more ‘vanilla.’ If feedback is becoming ‘vanilla,’ then a team is not functioning at a high level of team emotional intelligence.

If you contrast this with the team experiences where they filtered feedback into a place of learning, and they began to seek out feedback before finishing their portion of the work, they created a team that would be genuinely engaging in the team's emotional intelligence norms. While not all feedback would provide you a warm, fuzzy feeling, it can open the space for constructive dialogue about honest thoughts about what you are doing well and what you want to do better (Norm 4&5). For those that had positive experiences with feedback, they used it to build optimism (Norm 6) as they remained hopeful for the second iteration, and they used it to help them to more quickly anticipate and solve future challenges (Norm 7) with their second design-based project. The one team that shifted their view of feedback from the grizzly bear to the revision ethic was continually making iterations on their second project and pushing towards excellence until the final deadline. That revision ethic was ‘rewarded’ in the grade given for their second iteration.

6.4.3. Metaphor 3: Do You Belong at the Table?

> *People don’t always know how to act with women…On a team that I was in over the summer [course], we were up all-night working, and at one point, one of the guys at the next table was there snickering. And, oh, someone on my team says, “Oh, he’s made a fake dating profile, and he’s trolling older women on this*

dating site. And they are thinking that's funny. I have two guy teammates, one guy comes up and shows the other guy teammate the phone, and they're laughing. And the other guy says, 'don't show her that.' He's like, 'I won't.' And then I flash back to a presentation on inclusion and diversity…the one thing she shared that I thought was great, was when she said, "Are you surprised…you shouldn't be surprised that anyone is at the table. And everyone should have the feeling they knew I was coming, they planned for me to be here.' And that incident made me feel like they didn't know I was going to be here. They aren't prepared for me to be here. They don't want me to be here.

6.4.3.1. Burrowing Reflection

Sitting at a table where you are not sure you belong feels very different from sitting at a table where you know you are wanted and belong. Sitting at a table discussing conflict as a place where you feel like you belong can be very different from one where you do not feel like you belong. As the participants reflected on the table-side discussions, their narratives explore how the same conversation can feel very different depending on your answers to the questions, are you surprised I am at this table, are you prepared to have me at the table, and do you want me at the table. One participant shared about the holiday dinners where you have nowhere to escape, causing me also to consider the question do I want to be at the table. The first series of experiences is through the lens of the participants worrying about not belonging or angry by the fact that they are required to be at the table.

The first participant reflecting on worrying about being wanted at the table:

> Okay, well, how are they going to take my humor? How are they going to take…we all have different ideas. We wanted to use this program or that program. We wanted to use this format or that format. I just felt insecure at that point because I say, well, I don't want to be the one that puts out that idea, and then everyone goes, 'oh, that's a stupid idea, Mason."

Another participant made it clear that she did not want to be at the table with her teammates:

> I asked a question that could have gone un-asked. What I asked was, 'can we change groups?" I was not really happy with one of my teammates based on past experiences, and since I was tired and emotionally spent, I had no filters. Unfortunately, it caused issues for the professors, but I think the issues would have come up without my comment. What I learned during this course is the team member that I didn't want has been a valuable asset to the team, and I should consider giving people the opportunity to prove my first impressions were not the correct ones.

One participant shared about the time he was frustrated and had to be stern at the table [meeting] because he felt like only a few of them were prepared to be at the table:

> I was like, I don't like raising the voice and getting angry. That's not me at all, but I was like, guys, we got to focus here. We have an hour. We need to get this done. We need to move to the next step, and we need to finish this because we only have the weekend. And it's a holiday weekend. I'm out of here. I'll still work on it. Sue is out of here. He's going to be doing stuff. We need to finish this, and we need to have a clear path because there's not going to be another meeting. As much as you guys would like to think maybe there will be, there's not. I don't like doing that unless I need to, so that was a difficult time for me.

This next series of stories bring to life the contrast of when someone feels welcome at the table. The first participant felt like maybe he was not going to belong, but through the interactions that quickly changed.

> Oh, because again, my first perceptions were, okay, well, I'm the odd man out because of prior team [member relationships], but that lasted two minutes.

Another participant shared how they valued their experience at the table where he felt open to express his thoughts and ideas and that everyone else had a voice too.

> I value the open dialogue. You know, because it starts bringing all those ideas to the table. If you don't, then usually you'll have this one person, 'hey, I think we ought to paint it blue,' and no one says anything and then we all paint it blue. Then it really wasn't a team, it really wasn't a collaboration. In past groups that we've worked with…you get some of that…I think we have the perfect mix of

> talent and a perfect mix of attitudes where, when you're on your good days, when you're on your bad days, there's enough in the mix that offsets it and it's not a task to go, 'okay, I'll just do it all, or let's just stop because we can't make a decision.' It all flows and it shapes.

This next participant shared about the table where you can come and brainstorm and develop ideas to help you make the decisions you need to make. It is a trusting place where you are free to speak up and share with an open heart and ear to the feedback that is provided.

> So, for me, I can sit [at my desk] and come up with an idea, and it's usually a decent idea. But if I get [at a table] with people and start brainstorming and collaborating on something and once I hear other people start speaking, I usually can come up with some of my very, very best ideas because they've triggered something in my head…I like to have sounding boards…if other people come up with ideas, I like to be sounding board for them and help develop other ideas. And I like them to be my sounding board to say it's really stupid or even doesn't work…so I just think, in working as a collective and collaborating is always a better environment…and it usually is going to yield better results.

6.4.3.2. Broadening Reflection

For team members to feel like they belong at the table, the team emotional intelligence norms would support the member in feeling like the team knew they would be at the table, they were prepared for them to be there, and that they wanted them to be at the table. In that first story, the participant was dealing with teammates that she felt had no understanding of her (Norm 1) as they trolled older woman on a dating site. When you are worried about being wanted at the table, like the participant who felt unsure about speaking honestly and throwing ideas out there, you can't be a team that is fully utilizing the norm of supporting expression (Norm 5). The team member that did not want to be at the table with a fellow classmate started the experience with an

impression that could have impacted the team climate and performance, but as the team, emotional intelligence norms of understanding team members (Norm 1), demonstrating care (Norm 3) and supporting the expression of honest thoughts and feelings (Norm 5) moved into practice, their relationship shifted to one she describes as an "unexpected lifelong friend." Across the positive experiences at the table, we see an optimistic (Norm 6) view of the conversations emerge, it became a place where team members want to solve problems (Norm 7), and honest feedback would be provided, all members at the table would be cared for and given voice (Norm 3). We often assume a family table is a positive place, but it only becomes a positive place if everyone there feels like they belong. In exploring this metaphor, what became evident was the person that shows up to the table must want to belong, and the people at the table need to act in a way that makes them feel like they are wanted and belong at the table. So put another way, the internal climate of the individuals at the table must be open to an external climate that wants them to belong.

6.4.4. Metaphor 4: Family with an Addict

> A weak link changes the dynamic…you can no longer really be a team…[in] families with addiction…everybody knows that a family ceases to function normally, when you have an addict…you have kids being parents, and…little allegiances form. Because you have to, in order to compensate for the one that's not contributing.

She went on to describe how having an addict in the family impact the lines of communication by connecting it to a presentation on leadership from a past NASA employee that worked in mission control:

> He talked about open channel. And the importance of having that open channel [of communication], and people not going off on the side…and like our team, I

> trusted our open channel. That's not to say that no one ever had a [side] conversation…but I trusted the open channel…if there was a side conversation, it wasn't because we didn't trust the group, it was because it was not productive as a group… when there's one person who is not pulling their weight, then you [often] get that unproductive side channel or the side channel where the [decisions are actually being made].

6.4.4.1. Burrowing Reflection

As some participants shared their experiences with a team member that they did not feel was pulling their weight or they perceived as a weak link, they discussed how the team became fractured. One participant shared how as the end of the second project neared, he felt,

> We have become more fractured in the last few weeks as one team member has made it clear that their time is more valuable than the rest. This has caused other team members to increase their workload [decided upon in those side text conversations] to compensate and has created some resentment.

In a different data point, a participant was referring to this same experience and shared how "you should see some of the text messages I get from single people of the group during all these" [virtual team meetings]. Another description of this breakdown came from a participant who described some of those side channels that happened during the creation of the final artifact.

> Sue on my group, he's done a really good job with behind-the-scenes stuff, maybe stuff that the rest of the group doesn't see. Stuff where we'll be talking on the side, or he gears up, or we'll have a late-night conversation. I probably talk to him once a week. Especially with the [project], it was like two or three times a week where he was putting together the actual paper part of it, the two of us. He brings a lot on that sense, and he knows it.

One issue with addicts in the family is that those around them tend to be enablers because they often create the conditions, so the person does not have to address the

problem. When there are weak links on a team, team members often enable the behaviors to continue. One enabling behavior surfaced from this reflection:

> His content wasn't exactly what I wanted for the [project], but he definitely put his effort into it. That was an effort. I give effort grades.

One last story that emerged from the data made me reflect on how having the addict on the team can create hidden stories or cover stories (Olson & Craig, 2017) to hide the real lived story of a team. These hidden stories can show up in the side-channels of communication, but they can also come from the hidden stories your team does not know. One participant shared,

> I'm an active member of Alcoholics Anonymous with 16 years of continuous sobriety. I don't hide this fact, but I don't lead with it in professional settings either. Many people I've worked with for years probably don't know this part of my story. I share it here because I want this course and exploration to have real impact in my life, so I want to be entirely honest and to bring all of me to work.

6.5. Final Broadening Reflection

Just like you bring all of you to work, whether you admit it or not, you bring all the team to work, which includes all the individuals and their stories along with the true team story which might consist of a babysitter, a grizzly bear, an addict, and a table where many stories, counter-stories, and cover-stories are shared, and many hidden stories are never known. In accepting the 'team as family' through some rose-colored lens, we fail to give space for the true lived stories or the creation of a team story that offers value to all the individual and team interactions without the need to create the cover story or to keep stories hidden. Bruner (1986) describes how stories shape

individuals' lives and practices, and I can imagine how that applies to the emergence and creation of a team story:

> Stories define the range of canonical characters, the settings in which they operate, the actions that are permissible, and comprehensible. And thereby they provide, so to speak, a map of possible roles and of possible worlds in which action, thought, and self-determination are permissible (or desirable) (p.66).

While the emerging story could place limits or constraints, they can also become be a place of comfort (Olson & Craig, 2012), and it might just be at this place of constraint and comfort that the magic of a team can find the power to flourish. While Ritchie and Wilson (2000) wrote exclusively about teachers, we could replace the word teacher with individual in their analysis and apply it to team members:

> A further source of power, in experienced [individuals'] stories, is inherent in the socializing force of stories. Stories create a sense of belonging; [individuals'] stories represent insider knowledge and insider membership. (p.67)

For the stories to create this sense of belonging and safety on a team, we must acknowledge that "stories are not innocent. Indeed, variations in stories constitute one of the commonest sources of conflict in human affairs on all levels, from individuals in intimate relationships to entire societies. Every side in every conflict is telling a different story." (p.107). In only telling the rose-colored view of the 'team as family' metaphor, we fail to share every side within each conflict a team may experience. In allowing the family metaphor to go beyond the scope, roles, and objective and into the emotional interactions of team members through the family metaphor lens, we see a different light into why a team's emotional intelligence is critical to how a team functions and ultimately performs. As students were given the opportunity to reflect

beyond their cognitive ways of knowing a team and explore the embodied and emotional ways of knowing as they journeyed through a shared-lived design-based learning experience, they dove way below the surface of a warm, fuzzy team as family image and explored the social and emotional components of doing and being a team. Instead of placing a prescribed story of how things should be (rose-colored team as family), this study allowed for the creation of how things are on your team, and maybe in creating that space, we provided a path to the freedom needed for leaders and team members to design their best-loved team. One participant shared, how her view of working on teams has shifted, and she has already made changes within her organizational context that are allowing her to live as her best as a leader of teams:

> I realized there's so many things my mind alone wouldn't have caught because I don't have all the expertise that [they have]. I realize how much more of a benefit it was to work in a team versus doing it for myself. So that's helped me to see that perspective differently, and kind of change some of that bias I originally had. I'm glad because this next year at work, I'm changing job roles, and it's all going to be about teams, like not just my team but my team leading teams. And I needed this perspective change, for what I have coming up.

If we don't allow for the freedom of students, team members, or leaders, or just individuals to create their best-loved self (Craig, 2013b) or best-loved team story, we run the risk of silencing them through some prescribed story that is not their reality (Huber & Whelan, 2001). My participant that was an active member of the Alcoholics Anonymous experienced first-hand what happens when a friend accepted their prescribed story of being an "addict" and ended up having their story silenced. What struck me was that this participant did not take that experience as part of her hidden story from the team (a team that she was no longer working with toward a goal) and

shared an emotionally raw and honest email to the group, that started with, “I’ve had a rough week, and it feels strange not to share it with you” and ended with “I just wanted to share with you…life is fragile. Hug your loved ones! And if anyone you know ever needs help with addiction, feel free to share my name and numbers. Others were there for me, and it is an honor to pass it on.” One of the teams in this project had created the space for “all stories to be brought out into the open and made public with others” (Olson & Craig, 2012) and not because they became a rose-colored family, but because they became a knowledge community (Olson & Craig, 2000). In building a community of knowing, through their shared experience where it was a safe place for each individual team members narratives to co-exist with the creation of their team narrative, they embraced this group, originally meant to support their development of transversal skills within a bounded course, to become a community where the expertise, support, challenge, and learning allowed them to continue creating new narratives of identity and practice as they continue to bring all of themselves to a table of learning, where they are welcomed, prepared for, and wanted as they journey to becoming their best-loved self as a leader of teams, member of teams, and in their personal context.

6.5.1. Reflective Conclusions for the Broader Contexts

When policies or norms are imposed on an individual or team that is not ready to enact them, there is a risk of a false, rose-colored metaphor guiding the actions of the team. On the other hand, if you create a learning climate that creates a safe space for embracing all the stories that are brought to the table or could be brought to the table, you are giving the power to the individual and team members to be the “curriculum

maker(s)." According to PWC's CEO survey report (2017), the hardest skills to find when recruiting new employees are (1) creativity and innovation, (2) leadership, (3) emotional intelligence, (4) adaptability, (5) problem-solving. All of these skills cannot be performed by machines, but they can be developed through team-focused design-based learning experiences if the pedagogical approaches scaffold their development. As policymakers, researchers, and educators within the engineering and education sector seek to find ways to support the needs of industry, shifting from only focusing on developing the skills that a machine could do for us to the ones that are solely human is needed. In allowing that shift to happen, voice and the power of being the "curriculum maker" need to be given back to the learner and teacher as they allow for the babysitter, the grizzly bear, and the addict to all sit at the table to explore their past stories, embrace feedback on their present stories, and revise their future stories in community with one another. Narrative inquiry as method and methodology allows for all those stories to co-exist and be heard so that we can stop handcuffing ourselves to rose-colored metaphors or mindlessly accepting prescriptive doctrines and instead enable the learners to examine their own practice and create their journey towards becoming their best-loved self or in this case their best-loved team.

7. CONCLUSION

This dissertation explored the design challenge question of how might we create learning experiences that allow a learner to know, do, be, and become their best-loved self? I entered into this dissertation with *"An Educational Allegory,"* written by Aesop Jr. in 1899 about a school for the development of animals based on the belief that the best animal was the one that could swim, climb, fly, and run. If a fish struggled with running, the teacher should focus their energy on running instead of supporting them in their craft of swimming. The allegory describes a school that believes a learner would know, do, be, and become their best-loved self by focusing on developing a wide array of technical skills decided by someone outside of the classroom. That school closely describes how our education system still functions today. In taking a different stance, the remainder of the dissertation took up Herbert Spencer's (1859) famously posed question of "what knowledge is of most worth?" by attempting to give voice to the learner in answering what knowledge is of most worth in becoming their best-loved self, so it is through the learners' story—the learner commonplace--that each article of this dissertation entered.

In the first article, *A Butterfly's Lived Experience: An Integrated Way of Knowing, Doing, Being, and Curriculum Making Your Best-Loved Self*, I, the researcher, was the learner. This article was my first iteration on what knowing, doing, being, and becoming your best-loved self might be. In the second article, *Flipped EQ: A Narrative Inquiry into Utilizing Design-Based Learning Experiences to Learn Transversal Skills*, I entered curriculum-making through the learners of an undergraduate engineering class

and explored their narratives about different pedagogical approaches and learning experiences aimed at developing skills that transcend disciplines or transversal skills. In the third article, *Designerly Ways of Becoming Your Best-Loved Self: Story Constellations of Four Engineering Students Learning Transversal Skills*, I presented an up-close view of four undergraduate learners' narratives on how learning transversal skills provided them a path to designing their best-loved self. In the fourth article, *Metaphors of Knowing, Doing, Being, and Becoming the Best-Loved Team: Removing the Rose-Colored Lens of the "Team As Family" Metaphor*, I explored two teams of graduate students and their journey co-developing transversal skills through a design-based learning experience. This final chapter seeks to connect the narrative threads across the articles to explore the insights gained into my narrative wondering of how might we create learning experiences to allow a learner to know, do, be, and become their best-loved self.

7.1. Framing the Dissertation Results

Based on Schwab's beliefs that knowledge must not just improve the state of the mind but also improve the state of affairs, that curriculum must address human need, and that learning should lead to 'more satisfying lives' it is through his commonplaces of curriculum that this study was situated (see Figure 1). In addition to being anchored in Schwab's original commonplaces, an additional commonplace of the prototype was added and explored throughout this dissertation. Embracing the underlying beliefs of 'teacher as curriculum maker' and the 'culture of prototyping' that is embedded within

the design and maker literature, prototype was added to provide an additional lens to explore what all designing your best-loved self might entail.

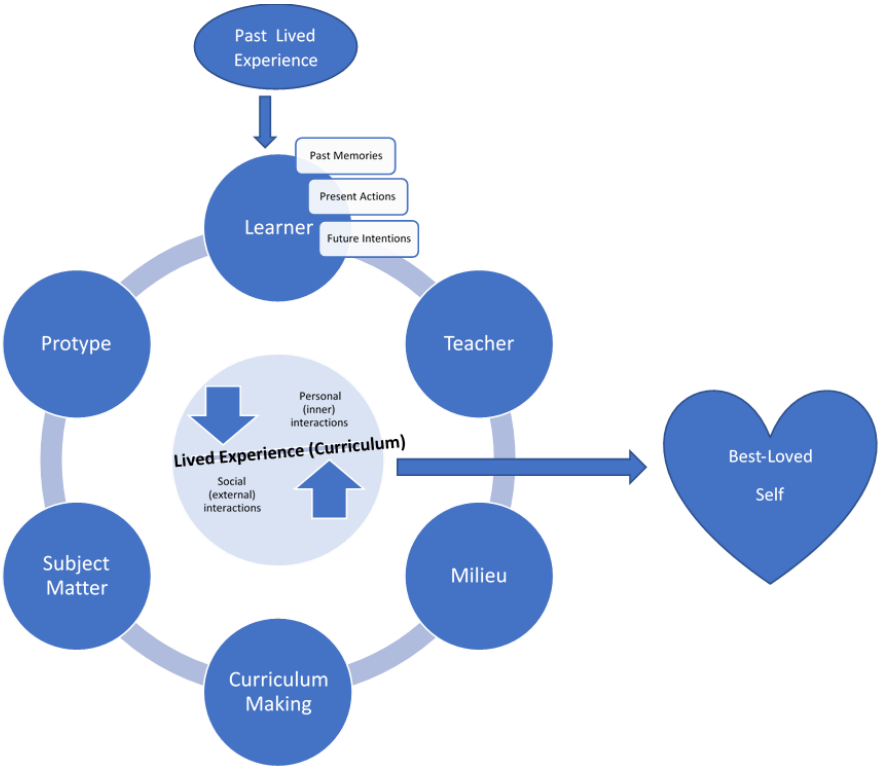

Figure 7.1 Conceptual Framework for dissertation.

While all articles enter through the learners' sensemaking through story, additional components of Schwab's commonplaces were consistently highlighted throughout each article: (1) subject matter: transversal skills, (2) milieu: design-based learning experiences, and (3) prototype: embodied knowledge. Transversal skills are "skills that are typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings" (UNESCO-International Bureau of Education, 2013).

Design-based learning experiences are problem-based team learning experiences where learners utilize the processes of inquiry and reasoning to build knowledge-in-action through interactions and iterations as they move towards designing innovative artifacts, systems, and solutions. Embodied knowledge builds off Craig et al.'s (2018) definition as "not simply knowledge of the body, but knowledge dwelling in the body and enacted through the body" and explores the transfer of knowing as it is enacted through the body into the design of the artifact. The process of becoming your best-loved self exists at the intersection of knowing well, feeling well, doing well, and being well, so one can live a more satisfying life.

7.2. Self-Knowledge for Transforming Future Action

As the learners engaged in their experiences, reflected on their learning and transformed future action, it was the negotiation between their inner self and external contexts that continued to emerge through their stories. Interestingly, it is at this place of alignment between the inner and outer self that Korthagen (2001) claims we can live as one coherent whole within our landscape or what I imagine as your best-loved self. In making known the places where that alignment does not exist, Aristotle describes this moment of learning or shift from 'ignorance to knowledge' as anagnorisis. That moment of learning (anagnorisis) proceeds or creates the pathway to peripeteia, or the sudden reversal of a situation. As learners gained awareness, they began changing behaviors to rewrite their imagined future story to be a different lived story. As Chergui (2019) wrote, "according to philosopher Arthur Schopenhauer, acquiring some degree of self-knowledge translates into a new version of character, previously unexplored, now

acquired to help the individual assume a new stance that will give meaning to his experience; this moment of his individuality that manifests itself to him shows him his aspirations and their limitations" (p.93). In Article 1, Helen acquired her self-knowledge from her student that visited the fish store and encouraged her to go back to teaching. In my parallel reflections, I explored the moment when my daughter provided my insight and encouraged me to make a decision that would force a different future story. In Article 2, told stories of learners who were "talking more with classmates," "open[ing] up more to family," and making "new friends." For others, the self-knowledge led to reframing stress and minimizing feelings of anxiety. In Article 3, one participant described that she was "passionate about how [she] changed." She was taking on new opportunities, building new relationships, and she appeared to have a fresh zest for life as she explored the possibilities of her future. Another participant was considering a different career path. In Article 4, some participants that hated teamwork discovered its value because of personally experiencing it and changed how they worked within their professional context. Another participant recalled how teams made him feel insecure and not worthy, but through experience and taking a risk, he shifted his position and found the courage to take more risks in his professional life.

7.3. Self-Knowledge through Embodied Knowledge of Prototyping

Cross (2006) described design as a culture of learning and thinking and defined it as the "collected experience of the material culture, and the collected body of experience, skill, and understanding embodied in the arts of planning, inventing, making, and doing" (p.1). In taking a stab at my first iteration of what best-loved self might be in

Article 1, I struggled to write that first article until I embraced a culture of prototyping. I started with just the parallel stories, but as I engaged in sense-making, it was in the process of creating a visual that I helped to refine my thoughts and express a way of knowing that I could not reach through words. In article 2, as the engineering students designed and created a straw roller coaster and a spaghetti tower, they were able to talk around more than just the physics and engineering principles behind their work and explored their thoughts, emotions, and behaviors, as well as their teammates' thoughts, emotions, and behaviors. In doing so, they could connect the components of emotional intelligence they had learned in class with the actions encountered as they created their prototypes and begin to transform towards a better version of themselves.

In article 3, the learners used newly gained self-knowledge to imagine and prototype their future best-loved self. They tried repairing relationships with family members, considered new career paths that made them happy, redesigned how they approach their academic studies so they could move off of academic probation, but across all the participants they accepted the idea that they have a voice in their 'story to live by.' In article 4, the learners went from at intellectual view of 'team as family' to an emotional way of knowing what happens on a team as they reflected on their planning, making, and doing of their design-based learning project. It was through the metaphors, like the babysitter, that one can imagine not only the team members' thoughts but the actions and feelings that would be present in the experience.

7.4. Implications for Future Research: Self-Knowledge as the Gateway, but What is the Bridge?

Self-knowledge or self-awareness might serve as the doorway to becoming your best-loved self, but this dissertation leaves me wondering how we design the bridge to becoming your best-loved self. What bubbled up for me was the constant teeter-totter between the various constructs needed as we design for our best-loved self. The first that emerged is the need to truly focus and design curriculum for both technical and transversal skill development within our educational experiences. For many students across the studies, this was the first time they had an experience in their formal education journey that focused on them as living, breathing human beings in relationship with other human beings. The second area that emerged from the research is the need to more deeply explore the space where the inner self meets the outer context. The third area that emerged were some skills that cross the inner and outer boundary and impact both the self and others: (1) self-awareness, awareness of others; (2) self-agency, agency for others; (3) self-compassion, compassion for others; (4) self-care, care for others; (5) self-vulnerability, vulnerability with others; (6) self-trust, trust for others; (7) self-honesty, honesty to others. A fourth area that emerged was the need to shift from the mindset of evaluation to one of growth. In expanding on the growth metaphor of Dewey, maybe we could consider the revision or iteration ethic that could exist within designing through a 'culture of prototyping.' A final area that bubbled to the fore for me was the need to continue to explore how we can design experiences to support learners in knowing across all their 'organs of perceptions' (mind, body, heart, and spirit) as we

empower them to own their ‘curriculum making’ as they design for becoming their best-loved self.

Knowledge no longer resides in the minds of a few, technology has provided everyone access to knowledge, but knowing how to transcend across the knowledge silos to design and innovate what does not yet exist, doing in a way that supports both the individual and the collective good and being in alignment with your inner climate and external context has the potential to create the becoming of our inner best-loved self and outer best-loved community. In beginning to more deeply explore how curriculum as ‘lived experiences,’ particularly design-based lived experiences, we might find a potential pathway to addressing the four agreed-upon pillars of education that were referenced in the Delors Report (1996): learning to know, learning to do, learning to live together, and learning to be (p.8). In designing the pathway, we may move education closer to bringing Schwab’s vision of learners having ‘more satisfying lives’ through the enactment of their ‘best-loved self’ (Schwab, 1954/1978; Craig, 2013), and help create the space for the four pillars of education to co-exist (p.270) as we design a more balanced education that is less about becoming an engineer or becoming a teacher and more about becoming a best-loved self that will more richly inform the multiplicity of roles we are called upon to play in society.

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